ERDC/CHL TR-01-4

Coastal and Hydraulics Laboratory

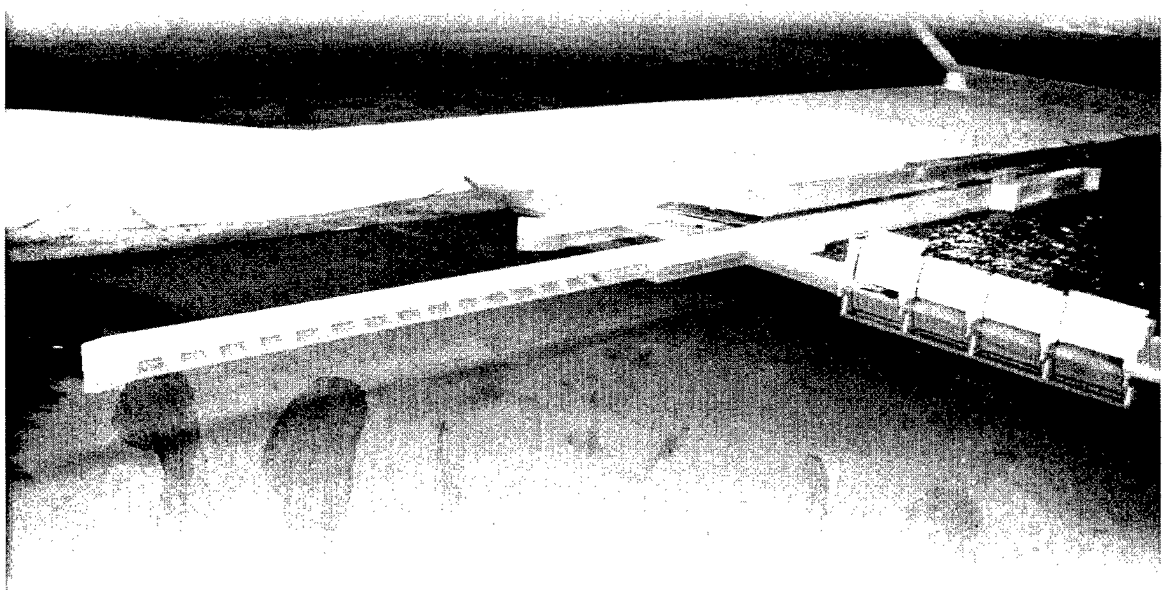
US Army Corps of Engineers®
Engineer Research and Development Center

Outdraft at Lock Approach, Tom Bevill Lock and Dam, Alabama

Hydraulic Model Investigation

Gary C. Lynch

March 2001



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Hydraulic Model Investigation

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Final report

Approved for public release; distribution is unlimited

Prepared for U.S. Army Engineer District, Mobile
Mobile, AL 36628-0001

Contents

Preface

This navigation study was performed by the Coastal and Hydraulics Laboratory (CHL) of the Engineer Research and Development Center (ERDC) for the U.S. Army Engineer District, Mobile. The study was performed during the period November 1997 - March 1999.

During the course of the model study, representatives of the Mobile District and Lock Operators visited CHL to observe the model and discuss results. The Mobile District was informed of the progress of the study by periodic progress reports and a Web-based digital summary at the conclusion of the testing.

The navigation study was performed by Mr. Gary C. Lynch, research hydraulic engineer of the Navigation Branch, CHL. Ms. Debby P. George, Mr. Keith Green, Ms. Peggy S. Van Norman, and Ms. Sally F. Harrison, Navigation Branch, assisted in the study. This report was prepared by Mr. Lynch, assisted by Ms. Dinah N. McComas, River Sedimentation Engineering Branch, CHL, under the direction of Dr. Sandra K. Knight, Chief, Navigation Branch.

Acknowledgement is made to the Mobile District and representatives of Tom Bevill Lock and Dam for cooperation and assistance at various times throughout the investigation. Special thanks go to Messrs. Howard Park and Don Wilson, Navigation Branch, and Mr. Dan Ulmer, Coastal Towing Company, Houston, TX, for their help in the study.

At the time of publication of this report, Dr. James R. Houston was Director of ERDC. COL James S. Weller, EN, was Commander.

Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
cubic feet	0.02831685	cubic meters
feet	0.3048	meters
miles (U.S. statute)	1.609347	kilometers

1 Introduction

Background

The Tom Bevill Lock and Dam is approximately 1 mile[1] southwest of Pickensville in Pickens County, Alabama (Figure 1). The lock was constructed on the left overbank about 332.7 river miles above the mouth of the Mobile River. It was the second navigation structure proposed for development of the Tennessee-Tombigbee Waterway. It is designed to maintain a minimum upper pool extending upstream to river mile 342.2 during low flows. The lock is 110 ft by 600 ft clear chamber dimensions. The dam consists of a gated spillway in the river channel and an adjacent 150-ft overflow weir on the right overbank. The lock is connected to the dam with a 150-ft abutment wall.

Purpose of Study

In the prototype, a strong crosscurrent or outdraft exists in and around the area of the upstream lock entrance (Figure 2). These conditions cause difficulty for existing tow traffic navigating the lock. For downbound traffic, the problem is a tendency for the stern of the tow to swing toward the dam after the barges are within the influence of the guard wall. Upbound traffic experiences the same swing on the front of the barges as the tow and barges leave the lock. Once the tow is also clear of the guard wall, the current tends to align the tow/barges with the outdraft, but the effect is not as pronounced. The purpose of the model study is to suggest possible solutions to improve and/or correct the outdraft for the approach of the tows.

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1 A table of factors for converting non-SI units of measure used in this report to SI units is found on page vi.

2 Model

Description

The Tom Bevill Lock and Dam study area incorporates approximately 1.6 miles of river upstream of the lock and dam and 2,400 ft downstream of the structure. Inflow is provided through both the Tombigbee River (Old River) and the Pickensville Cut-Off (Figure 1). The Tom Bevill Lock and Dam model (Figure 3) runs from about river mile 306.5 to river mile 308.4. The model was molded to July 1997 hydrographic survey data obtained from the U.S. Army Engineer District, Mobile. It is a fixed bed type, made of sand and cement mortar. This mixture is molded to sheet metal templates cut to match the contours of the area, then set to the proper grade. A Plexiglas pier indicates the Brooksville Road Bridge. This pier is the only part of the bridge included in the model since it is the only part of the structure to affect navigation. The lock, ported guard wall, guide wall, and dam were constructed of sheet metal and Plexiglas, placed into the model, set to the proper grade, and cemented in place.

The model was built to an undistorted linear scale of 1:100, model to prototype. This scale allows for accurate reproduction of velocities, eddies, and crosscurrents that affect navigation. Scale ratios resulting from 1:100 model to prototype include:

Dimension	Ratio[1]	Scale Relations Model:Prototype
Length	$L_r = L$	1:100
Area	$A_r = L_r^2$	1:10,000
Velocity	$V_r = L_r^{1/2}$	1:10
Time	$T_r = L_r^{1/2}$	1:10
Discharge	$Q_r = L_r^{5/2}$	1:100,000
Roughness (Manning's n)	$R_r = L^{1/6}$	1:2.15

[1] All dimensions are in terms of length *L*.

Measurements of discharge, current velocities, and water-surface elevations are quantitatively transferred from model to prototype by means of these scalar relations.

Modeling Procedure

After model construction, current direction and velocity (CDV) were recorded by tracking the path of floats in the model with a video tracking system (Figure 4). The floats were drafted to the same depth as towboats that use the river (Figure 5) to ensure that the current patterns affecting barge and tow traffic were being analyzed. Black and white film cameras situated above the model are connected to a frame grabber card in a personal computer. The frame grabber records the pixel position of lights that flash at set time intervals. This position is referenced to the model by a calibration file that matches the pixels seen in the camera lens to actual points on the model. Once the positions are recorded, a postprocessor program determines the velocity of the lights by the distance traveled in the set time for the frame grabber.

Confetti and dye plumes (Figures 6 and 7) are two other ways to compare and analyze different modifications to the channel and lock entrance. Confetti shows surface current patterns plainly, but the small floating pieces are also subject to surface tension of the water. The dye plume shows bottom current patterns as well as currents throughout the water column. However, the dye cannot be precisely placed and cannot be controlled once it is in the water column.

Using the video tracking system (Plates 1-5), current direction and magnitude data for discharges of 20,000, 32,500, 45,000, 57,500, and 70,000 cfs were collected to establish a base for analyzing proposed changes. These data will be discussed later in this report. These discharges, chosen in conjunction with the U.S. Army Engineer District, Mobile, include inflow from both the Pickensville Cut-off, or "New Cut," and the Tombigbee River, or "Old River."

The 45,000-cfs flow was used as the base flow condition when checking the maneuverability of the typical barge/tow arrangement (Figure 8) for 45,000-cfs total dam discharge. This involved using a remote control tow and barges. Runs were conducted to allow engineers to become familiar with the navigability of the existing channel configuration. A dam discharge of 57,500 cfs was also used in the analysis of the proposed changes as a quick check for problems that could occur at different flows. After an acceptable solution was identified and discussed with the Mobile District, all flows would be checked. For the final analyses the video tracking system was used to track the motion of the tow as it navigated in each current condition. This, along with the evaluation of the navigability by the pilot, assisted with the recommendation of the best alternative.

3 Model Experiments and Results

Preliminary Experiments and Results

Figures 9-25 show some of the different plans that were placed in the model to lessen or remove the crosscurrent and outdraft at the upstream lock approach. These plans typically left the existing dike in place and added different structures in an attempt to increase the flow through the guard wall or divert the flow over to the dam further upstream.

Figures 9 and 10 show two different configurations using bendway weirs and longitudinal dikes in combination. The top elevation of the weirs was approximately 15 ft below the water surface elevation. Although these did not significantly improve the approach to the lock, the bendway weirs did ease traversing the bend. One reason the weirs were not as successful as expected could be the shallowness of the channel. The effectiveness of a bendway weir is dependent upon the quantity of flow acting upon its surface area. The bendway weirs used for Tom Bevill did not have enough surface area to sufficiently intercept and redirect the flow because of the channel depth. One other consideration would be that once bendway weirs are in position, the opposite bankline scours until the original cross-sectional area reestablishes itself. This would allow the weirs to have more effect on the flow. Since the flow field did not change with the bendway weirs as anticipted in the model, this scouring of the bankline was not explored. Figure 11 shows the bendway weirs in the model.

Figures 12-16 show several uses of vane dikes (also tried as submerged weirs), some in combination with different longitudinal dikes along the left descending bank. Although the vane dikes did redirect water toward the lock entrance, as it passed the last vane dike the water accelerated back in front of the guard wall. This movement toward the dam was so pronounced that water would actually move slightly upstream to keep from going into the lock entrance (Figure 17). Entrance conditions did not improve significantly at the lock for any of these plans. The same results were found for the weirs, although not as much water was pushed over to the lock side.

The levee connected to the existing dike (Figure 18) seemed at first to enlarge the eddy in front of the lock entrance, improving conditions. However, the results were sporadic and did not prove successful under further experimentation. In fact, after analyzing the confetti shots, including the one shown in Figure 19, it was discovered that closure of this backwater area actually caused the creation of three separate eddies. The movement of these eddies caused the sporadic results.

Figures 20-22 show three more trials with vane dikes (also tried as submerged weirs). These trials provided little change in navigation conditions.

An extension of the riverside guard wall is shown in Figure 23. This extension moved the outdraft upstream. It did not remove it, and the tow still torqued stern toward the dam once inside the guard wall.

Figures 24-26 show various attempts at simply rebuilding the left descending bank to varying degrees. None of these attempts improved navigation to any significant degree.

After it was apparent that navigation conditions were not being changed easily, several methods were used to determine the cause of the outdraft. The first method was the removal of one-half of the guard wall (Figure 27). This was done to increase the cross-sectional area, allowing flow to pass through the guard wall to the dam and attempt to redistribute the flow. Flow patterns remained almost unchanged.

The next method involved placing a pump between the guard wall and the gate adjacent to it (Figure 28). This was to answer the question, "Is the outdraft caused from the gates being so far removed from the lock entrance?" The pump removed 14,000 cfs, equivalent to the discharge of an existing gate. The gate farthest from the lock entrance was closed and the remaining gates set as if the pump were the first gate. Again, little change was noted in the flow patterns.

After discussion with the Mobile District, the area in front of the lock entrance was dredged to an elevation of 110 ft[1] (Figure 29) to determine if the geometry of the bed was forcing the outdraft. Dredging alone did not solve the outdraft problem, so several more evaluations were made, including those shown in Figures 30-33, to determine if dredging in addition to added structures would improve navigation conditions.

The simple addition of the dike shown in Figure 30 did not have much impact on navigation conditions. Figures 31-33 each show modifications using guard wall extensions and longitudinal dikes that reduced the outdraft by displacing it, but did not remove the problem. The plan in Figure 32 showed the most promise reducing the outdraft and improving navigation.

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1 All elevations (el) cited in this report are in feet referred to the National Geodetic Vertical Datum (NGVD).

This plan, however, blocks a side channel leading to a boat dock just upstream of the existing dike. The dike in Figure 33 provides an opening for the side channel. The larger the gap left for side channel traffic, the less effective the plan becomes.

These last two plans call for approximately 3,000 linear ft of rock and/or soft dikes. Although placement of this much rock may be economically prohibitive, these plans show the most improvement of the plans analyzed in helping towboats maneuver the upstream lock entrance safely.

At the request of the Mobile District, two coffer cell extensions to the guard wall were also analyzed (Figures 34-37). The only difference between the two coffer cell arrangements is that skirts were used to restrict flow between the coffer cells of the second plan (Figure 36). The cells were 40 ft in diameter with 100 ft between centers. The unrestricted flow of the coffer cells without skirts (Figure 35) displayed the same outdraft problem of the prototype. The skirted wall also had the outdraft problem, but the skirted area seemed to provide a more favorable entrance once the tow was fully within the influence of the extension. Figure 36 shows a close-up of the cells used in the model. Figure 37 shows the cells and skirts in place in the model.

Several observations from the study then were drawn:

a. Modifications to the upstream channel and approach had minimal effects on flow conditions.

b. Structures attached to the riverside guard wall displace the outdraft to their farthest upstream point

c. Bendway weirs ease the transition through the bend upstream of the lock, but the water depth limits their influence.

d. Extending the guard wall with cells and the addition of longitudinal dikes on the left descending bank provided the most favorable improvements to navigation.

e. The snag boat *Montgomery*, located at the lock entrance and currently used as a museum, was a major concern when trying to keep the tow and barges toward the left descending bank on the approach and away from the dam.

Shortly after this phase of the study was completed, it was found that the removal of the dogleg section of the existing dike had an impact on the location of the outdraft. It was decided to bring this finding to the attention of the district for possible investigation.

Final Experiments

Once the preliminary results were reported, a meeting was held with members of the Coastal and Hydraulics Laboratory (CHL), the Mobile District, and representatives of the towing industry 11 May 1999. During this meeting it was decided that CHL should proceed with the following:

a. Remove the dogleg section of the existing condition (Figure 38) dike located upstream of the lock along the left side of the navigation channel, plus an additional 100 ft (Figure 39).

b. Dredge any areas along the left descending bank within the region of influence of the dike that would prohibit tow traffic.

c. Move and/or remove the snag boat *Montgomery* and its appurtenant structures (Figure 40).

d. Test two different guard wall extensions: a coffer cell wall with no skirting, but more cell area than the preliminary wall (Figure 41); and a floating guard wall (Figure 42).

For each alternative, CDVs and tow tracks were collected for each of the following discharges:

Total River Discharge, cfs	Upper Pool Elevation, ft	Lower Pool Elevation, ft
20,000	136.0	118.4
32,500	136.0	126.0
45,000	136.0	131.6
57,500	138.0	136.4
70,000	141.2	139.6

Final Results

These steps were carried out for each flow at CHL during June and July 1999. In the final part of this report, each alternative tested will be evaluated based on the CDV data, tow tracks, and the navigability of each.

Description of Conditions

Base Test

Figure 38 shows the Base Test, which has already been described in the first part of this text.

Plan 1 - Dogleg removed and dredging

Figure 39 shows the dogleg removed and dredging configuration. The existing dogleg dike was removed along with another 100 ft of dike, measured longitudinally along its axis. The shaded area was dredged to allow tow traffic to utilize this additional area.

Plan 2 - Museum moved

Figure 40 shows this configuration. In addition to improvements, the snag boat *Montgomery* was moved from its current position north and east to a position just within the shadow of the newly shortened dike. The purpose of moving the snag boat was to allow the towboat traffic to fully utilize the extra space provided by shortening the dike.

Plan 3 - Cell wall extension

Figure 41 shows the coffer cell wall extension used for evaluating the third plan. The coffer cells were 29 ft in diameter, with 55 ft between centers. The rubbing surface mounted on the coffer cells was 20 ft high, and was placed with the bottom of the skirt 20 ft above the bed elevation. The extension itself was 300 ft long and placed in line with the existing guard wall. The approximate blockage coefficient of the submerged area of the structure along the length of wall to the total submerged area under the extension was 81 percent at 45,000 cfs (Figure 43).

Plan 4 - Floating wall extension

Figure 42 shows the floating wall extension used for Plan 4. The 300-ft-long floating wall was drafted to 12 ft and was held in place by three cells. The total blockage area of this wall at 45,000 cfs was approximately 68 percent (Figure 43). The difference between these two walls was meant to show two relative extremes in blockage area for extensions that still would allow flow to pass through the structure, and also to observe the changes these differences made to the flow patterns.

CDV Data

Current direction and velocity data were determined by tracking the path of floats with respect to ranges established for this purpose. To simplify the plates, only currents in the main part of the channel where a tow and barges navigate are shown. Plates 1-25 show the CDV data in full. Plates 26-50 compare velocities at the ranges shown in Figure 44.

Some general points of interest concerning the currents are as follows:

a. Velocities in the general area of the existing dike increase for discharges of 20,000 up to 45,000 cfs; the magnitudes drop at a discharge of 57,500 cfs and at 70,000 cfs as flows are distributed across a larger area (taking in more overbank).

b. Velocities in the area of the dike increase from the Base Test condition with the removal of the dogleg for the same flows as previously stated; for higher flows, magnitudes are similar to base conditions.

c. Particularly for the two higher flows, a marked decrease in the angle of currents by the dike can be seen for Plans 2, 3 and 4. Plates 42 and 47 are examples of this. This decrease occurs for the most part with the relocation of the museum boat, indicating that the changes to the eddy pattern may be a major cause of the decrease near Range B.

d. A further lessening of the angle of current moving into the lock from Plan 2 to Plans 3 and 4 at Ranges C, D, and E indicates that the guard wall extensions do improve the entrance to the lock.

Navigation Conditions

Base Test

Plates 51-77 show the tow tracks for all flows. The 20,000-cfs flow was relatively easy on the approach to the lock, as it remained for the other tests. At 32,500 cfs, the outdraft began to take control of the barges approximately 600 ft downstream of the existing dike. At that point, the success of the run was largely dependent on the ability of the pilot to judge where the currents coming off the end of the dike lay with respect to the guard wall and being high enough to stay above the guard wall without being high enough to collide with the *Montgomery*. A high degree of steering and flanking were both needed, especially for the 45,000-cfs and higher flows. For these higher flows, no real successful lock approaches were accomplished.

Plan 1 - Dogleg removed

Plates 78-99 show the tow tracks for all flows. The 20,000-cfs flow proved not to be a problem for navigation into the lock, requiring very little flanking. At 32,500 cfs, once again, the outdraft began to take effect and flanking was needed. This extra maneuvering increased for each higher flow. By 57,500 cfs, there were no successful lock approaches. Each run that did not end in a collision with the guard wall ended with the tow drifting toward the dam with no control within the confines of the tests, as shown in Plate 94.

Plan 2 - Museum moved

Plates 100-121 show tow tracks for all flows. This condition is the same as the dogleg removed but with the *Montgomery*, the museum, moved upstream along the bank. The tow tracks show the same results as those discussed in the previous section. The moving of the snag boat museum, although allowing the towboat to come in higher in the channel approaching the lock, does little to affect the currents actually acting on the boat in the approach. At the higher flows, 57,500 and 70,000 cfs, the currents again overtake the tow, once the front of the barge has laid up against the guide wall.

Plan 3 - Cell wall extension

Plates 122-149 show all tow tracks for the cell wall extension. This scenario was a significant improvement over the other three conditions. In all but two of the runs (Plates 145 and 148), the tow and barges were within the protection of the extension before the outdraft had a chance to really affect the stern.

Plan 4 - Floating wall extension

Plates 150-166 show all tow tracks for the floating wall extension. This scenario was also a significant improvement over the base and first two plans.

4 Conclusions and Recommendations

Limitations of Model Results

The results of this study are based on the effects of various plans on CDVs and resulting effects that they had on handling characteristics of the towboat and barges. It should be noted that small changes in current direction and magnitude are not necessarily changes produced by a particular modification. Several floats introduced into the same point in the channel may follow slightly different paths and move at slightly different velocities due to the hydraulics of eddies, pulsating currents, and other hydrodynamic anomalies. The CDVs shown in the plates were taken with floats drafted to 9 ft, approximately the draft of a loaded barge. They are meant to be indicative of currents that affect towboat and barge handling.

It is also important to note that the model was a fixed bed model. This means that it was not designed to reproduce any changes in the bed that might occur in the prototype with varying flows. Thus, changes in the channel configuration resulting from scouring and/or deposition and any resulting changes in current direction and magnitude cannot be evaluated.

Summary of Results and Conclusions

The following generalized results and conclusions were derived during the study:

a. Even with the dogleg removed and the extra width dredged, the outdraft made it difficult to stay on the eastern side of the channel, away from the dam. The most notable change was a decrease in the angle of the current to the guide wall.

b. Moving the snag boat *Montgomery* museum while having an effect on the currents only in the area of the dike gave the operator the option of drifting up further into the eastern part of the channel without having to weigh his decision against the possibility of hitting the *Montgomery*. This would allow the towboat operator to ease down into the protection of the guard wall working against the eddy current.

c. Both guard wall extensions proved to be effective in making the approach to the lock safer for navigation. At flows of 45,000 cfs and higher, care still had to be taken to keep the tow and barges from pivoting toward the dam. However, the danger of pivoting into open water toward the dam was virtually removed.

d. The approach to the guard wall was smoother with the coffer cell wall than the floating wall; this could be caused by the amount of flow obstruction between the two. Further testing with skirts would have to be performed to confirm the effect.

Recommendations

CHL recommends the removal of the existing dike dogleg along with an additional 100 ft along its length. CHL also recommends the relocation of the snag boat *Montgomery* and its appurtenant structures. Finally, CHL recommends the extension of the western guard wall of the Tom Bevill Lock. Further study should be performed to optimize the flow blockage to lessen the tendency of the stern of the barge and tow to pivot toward the dam.

One additional note of interest: In conferring with towboat pilots about ways to approach the lock entrance with the changes in place, the idea of rotating the shortened dike or adding another leg as shown in Figure 45 was introduced. Unlike the recreation of various parts of the original bank line as performed in the preliminary experiments, this addition tries to divert the flow as the existing dike does. This concept was tried with temporary materials and showed some slight improvement in straightening the flow coming off the dike with the entrance of the lock. Although the improvement did not greatly enhance navigation, a simple study could be performed to optimize the angle of such an addition and determine if it would be beneficial. Any such addition would have to be carefully studied to avoid its creating a damaging current that could undermine the structure of the guard wall.

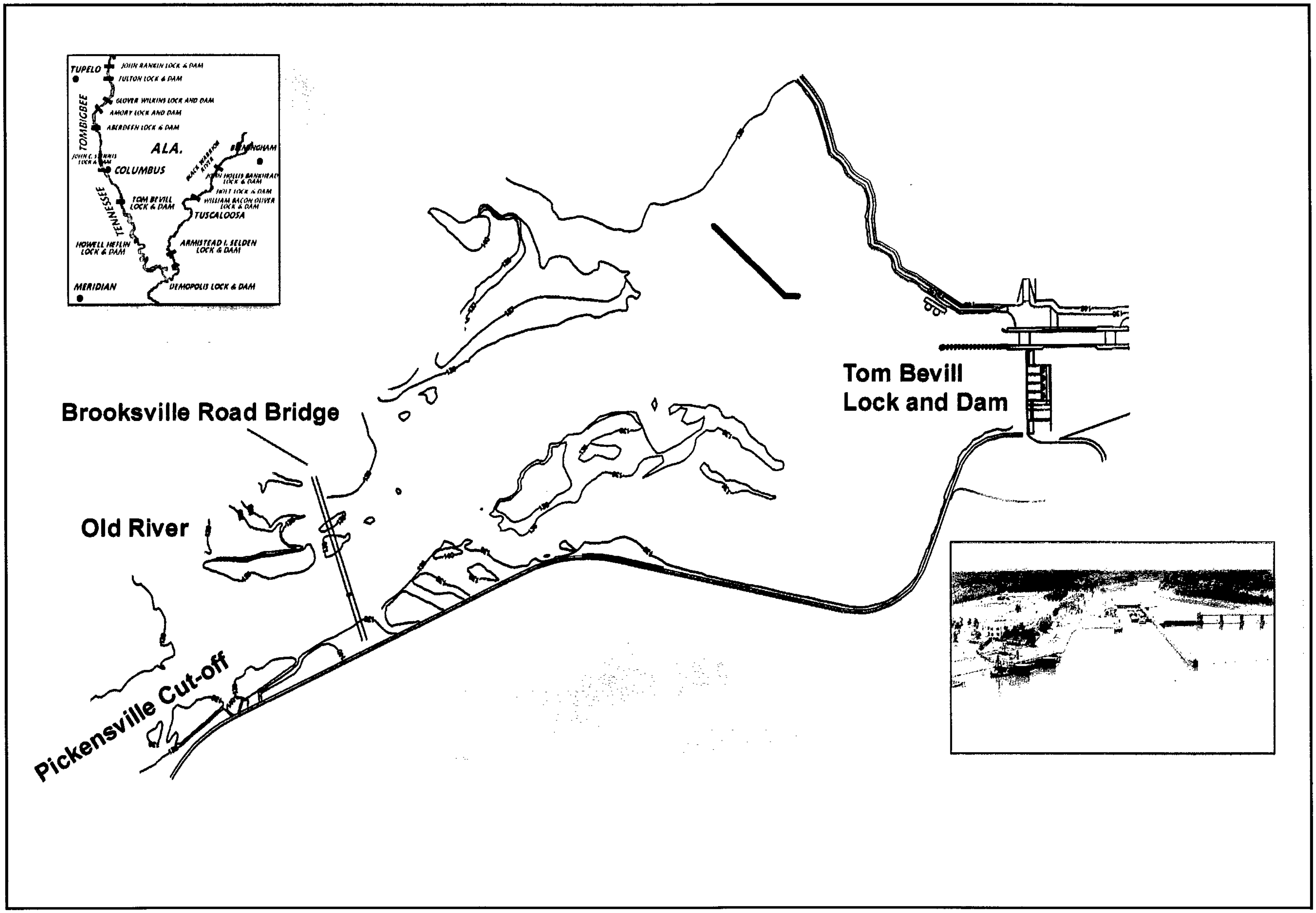


Figure 1. Location map

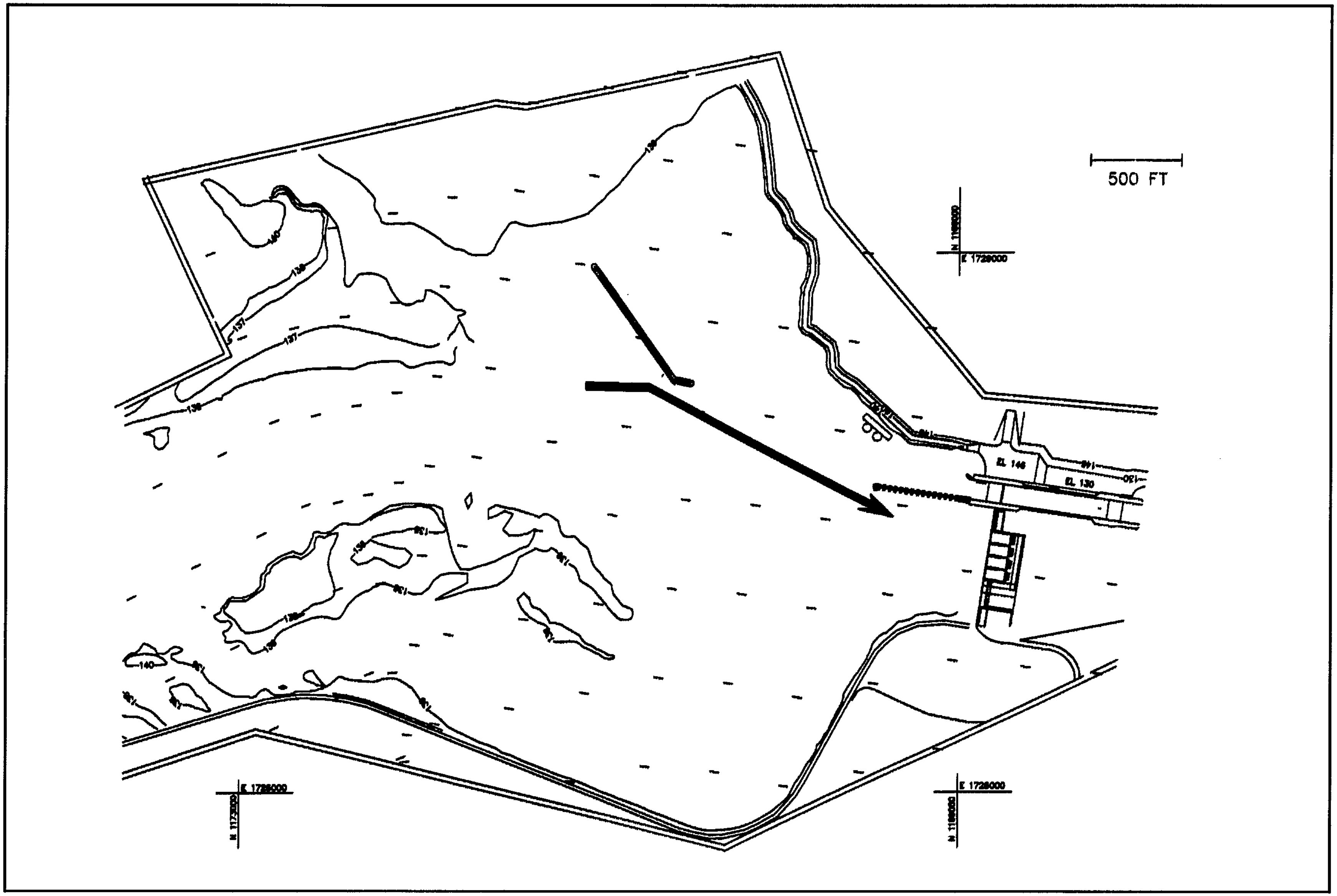


Figure 2. General direction of outdraft

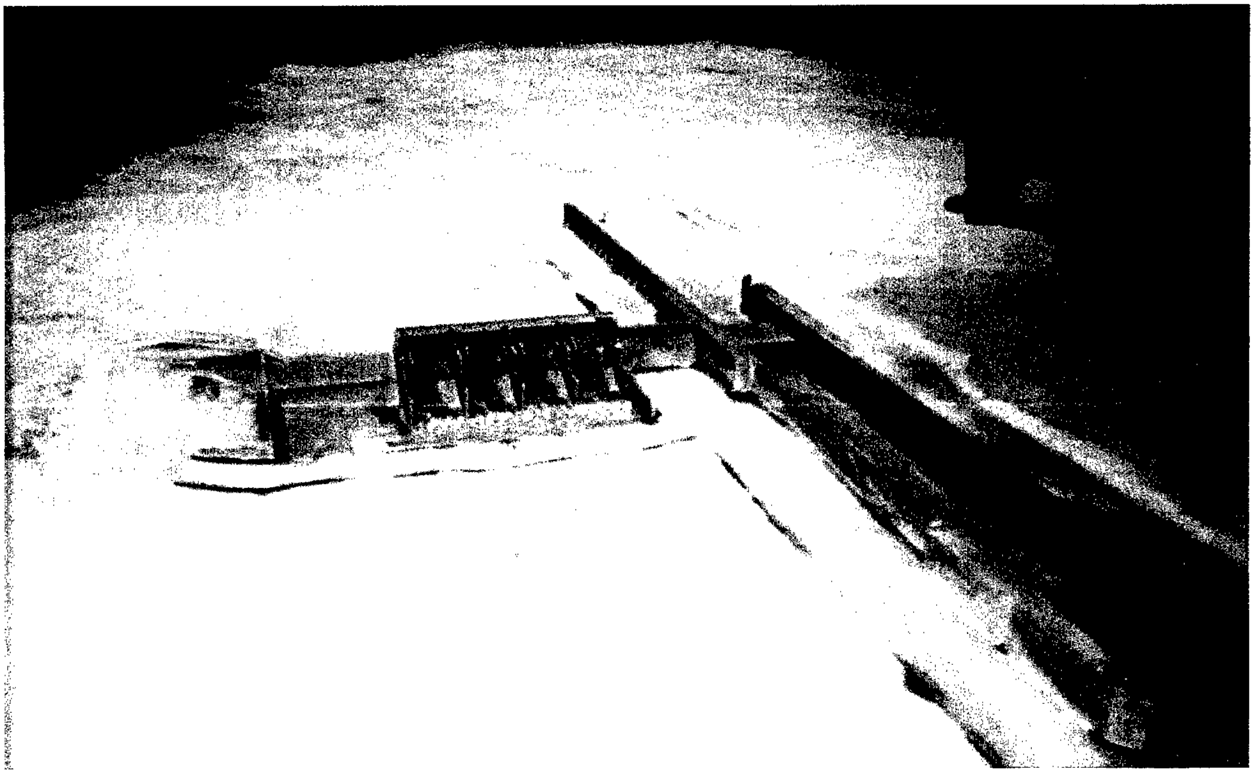


Figure 3. Model after completion

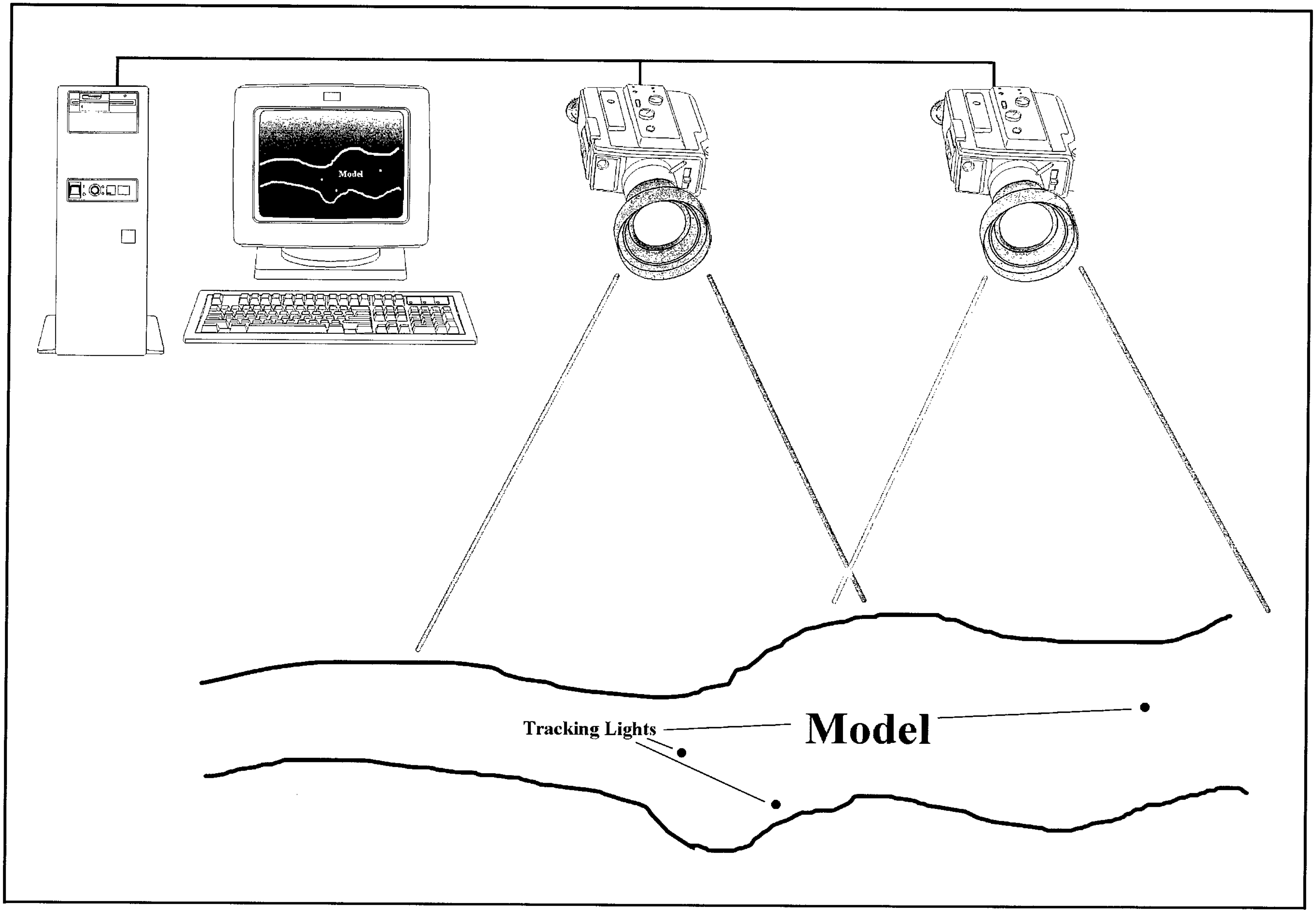


Figure 4. Video tracking system

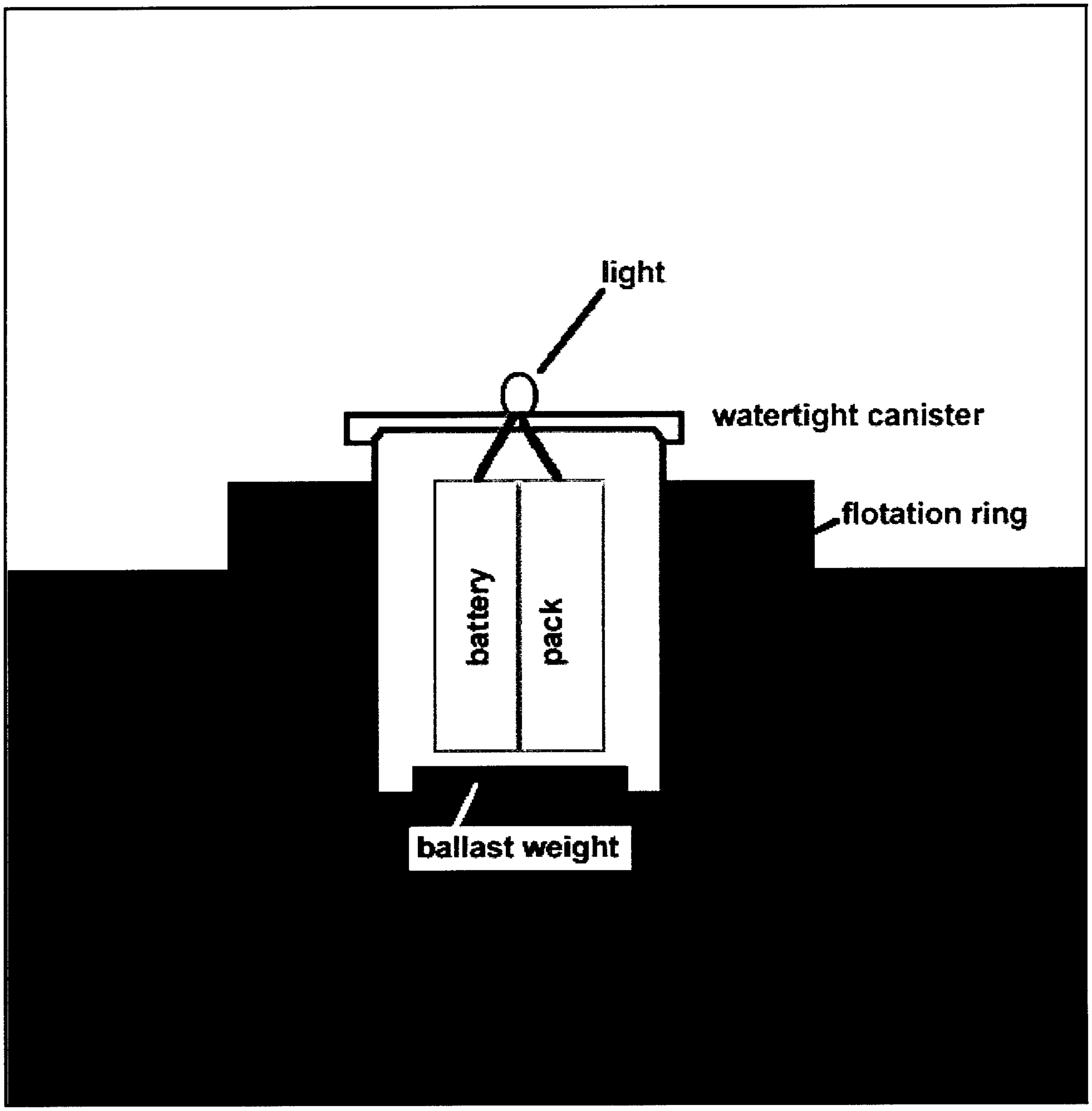


Figure 5. Cross-section view of float used with video tracking system

Figure 6. Confetti

Figure 7. Dye plume

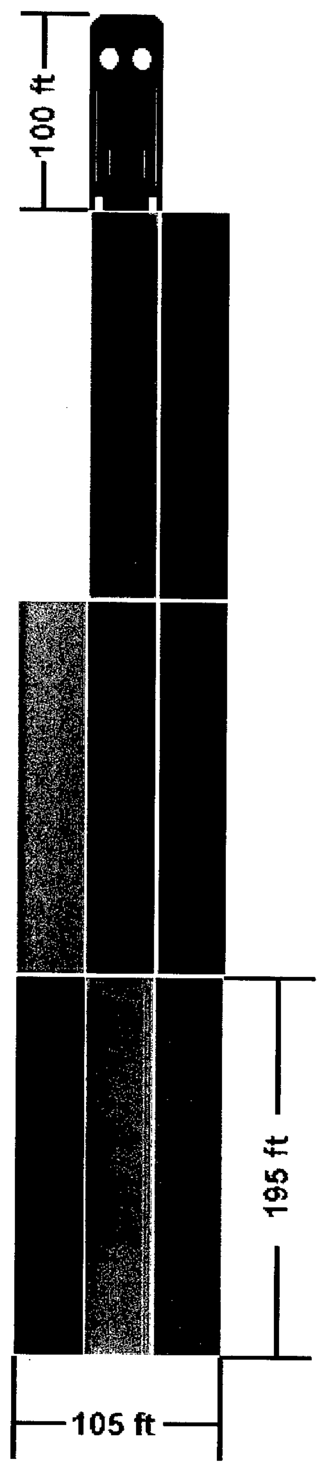


Figure 8. Tow and barge arrangement

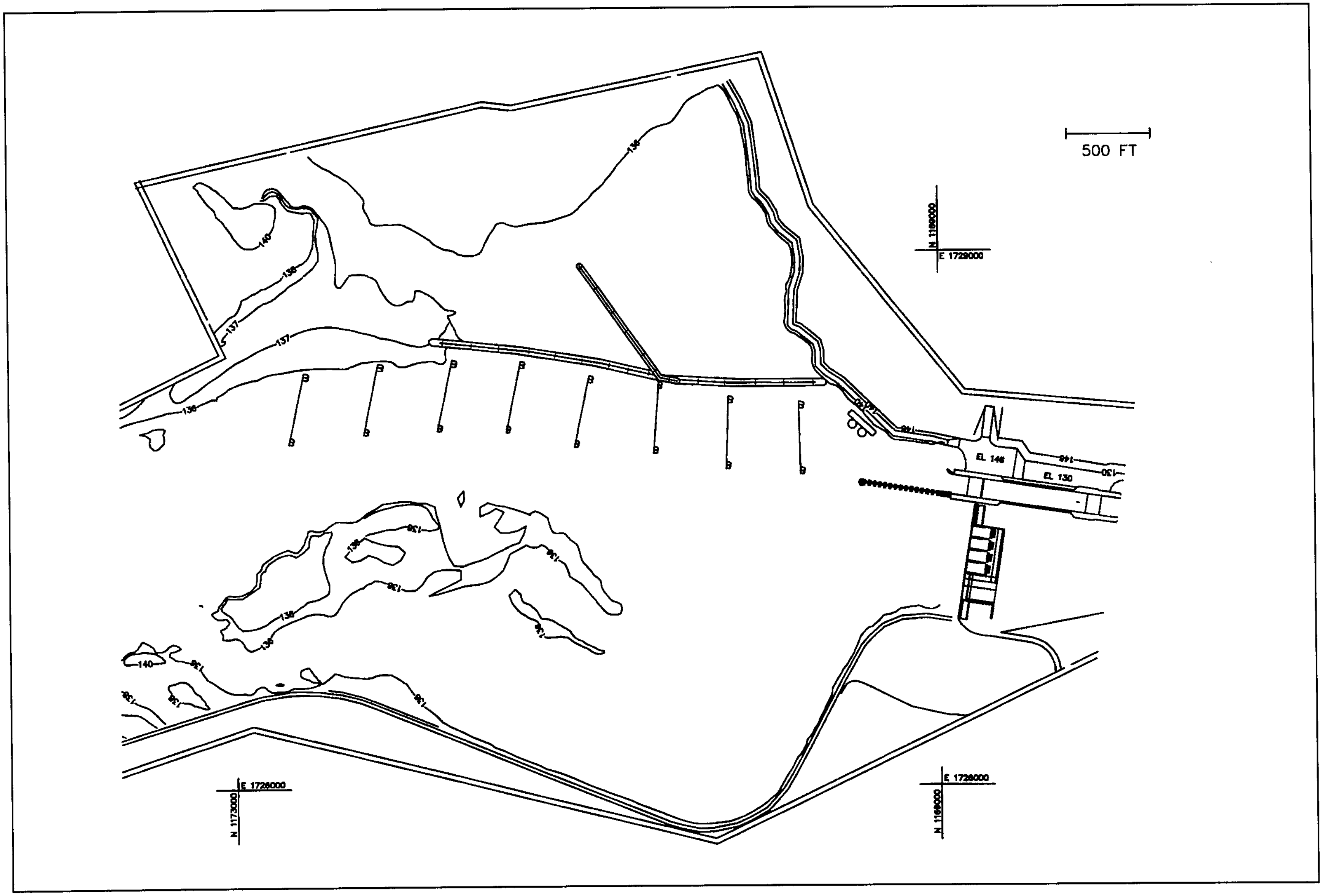


Figure 9. Preliminary experiments, bendway weir/dike Configuration 1

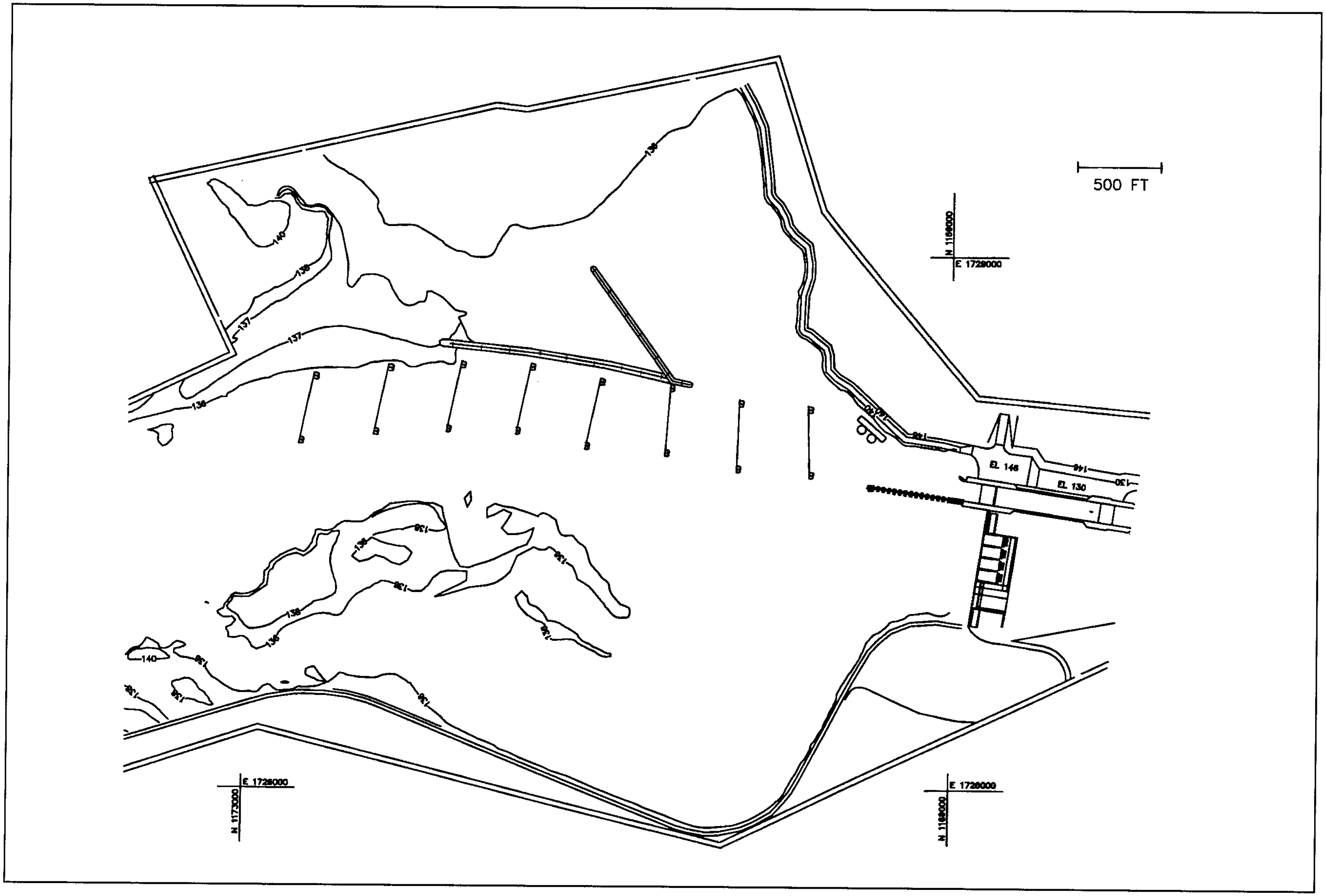


Figure 10. Preliminary experiments, bendway weir/dike Configuration 2

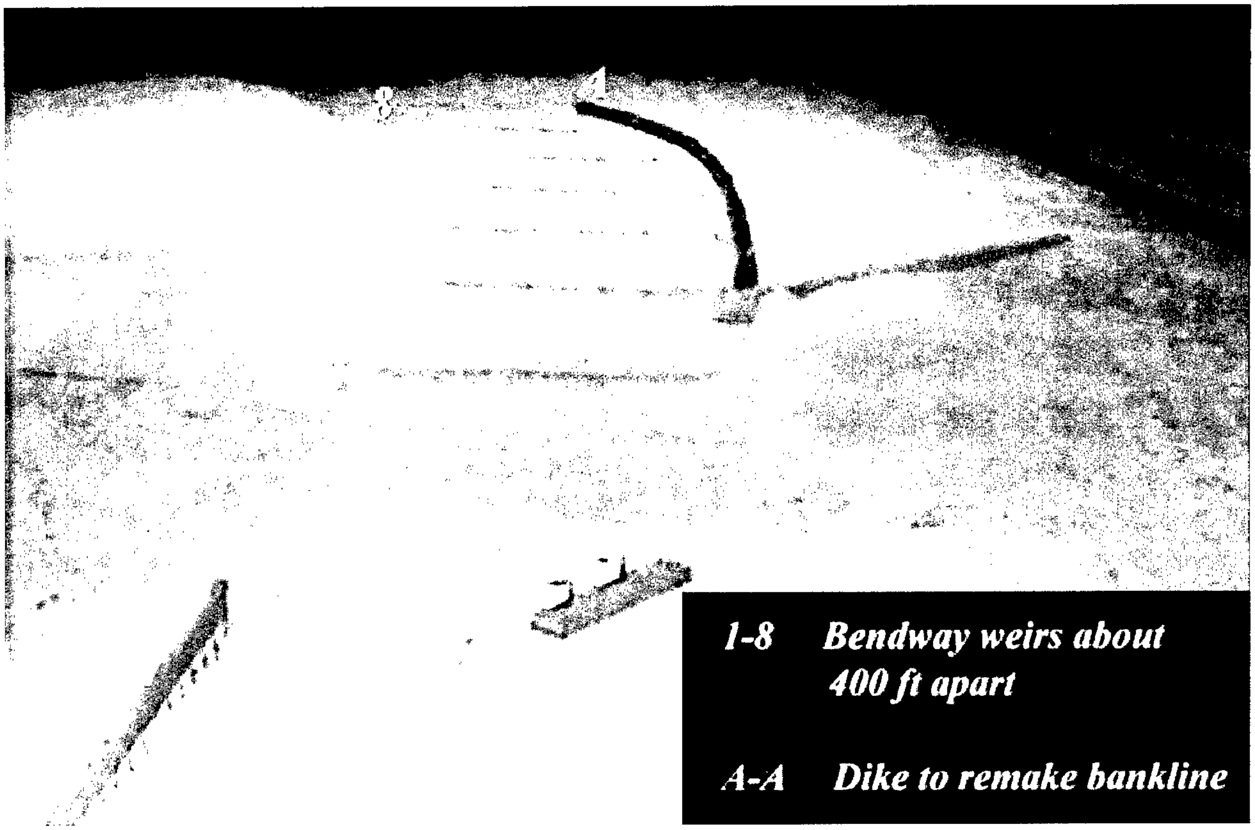


Figure 11. Preliminary experiments, bendway weirs in place on model, bendway weir/dike Configuration 1

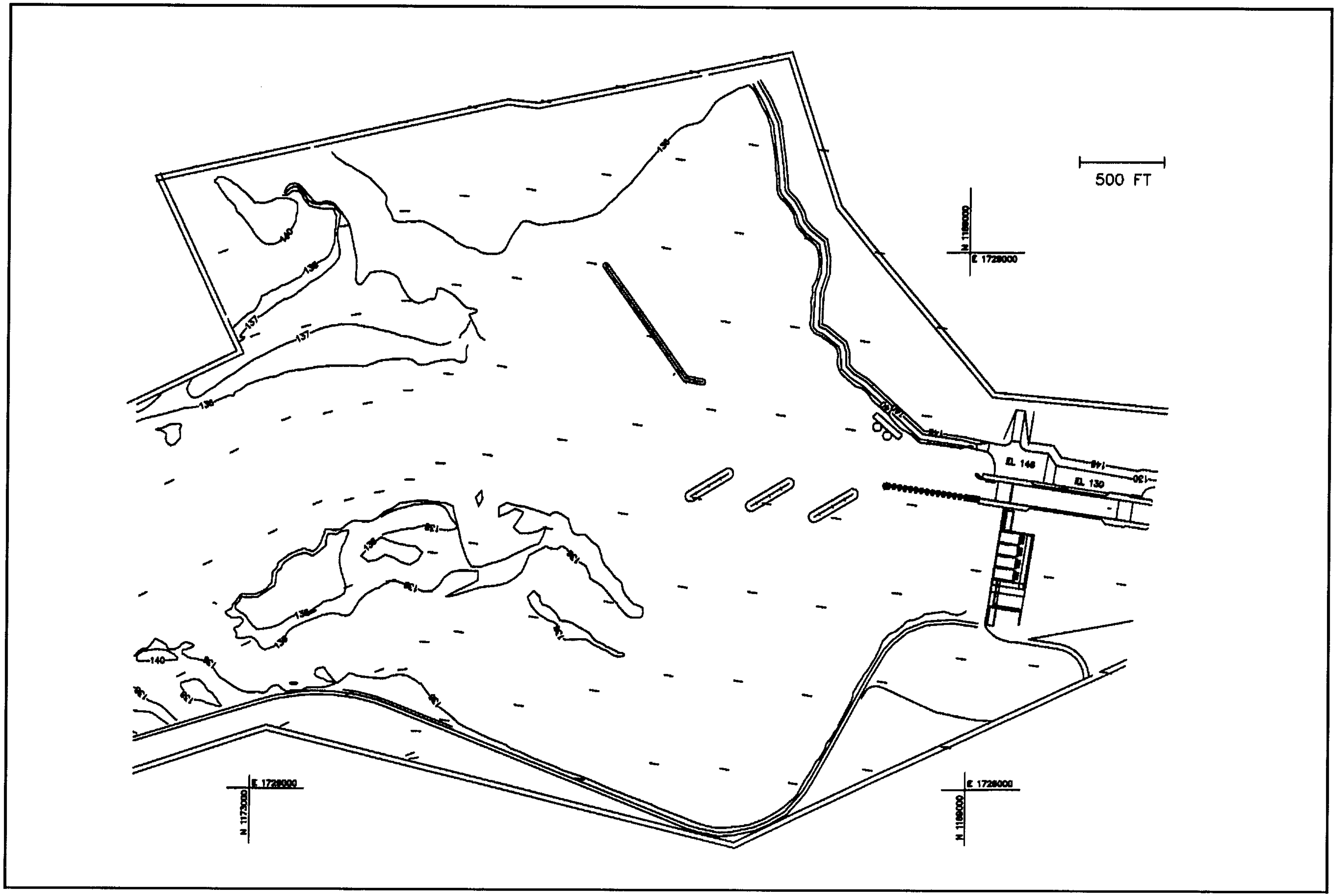


Figure 12. Preliminary experiments, vane dike Configuration 1

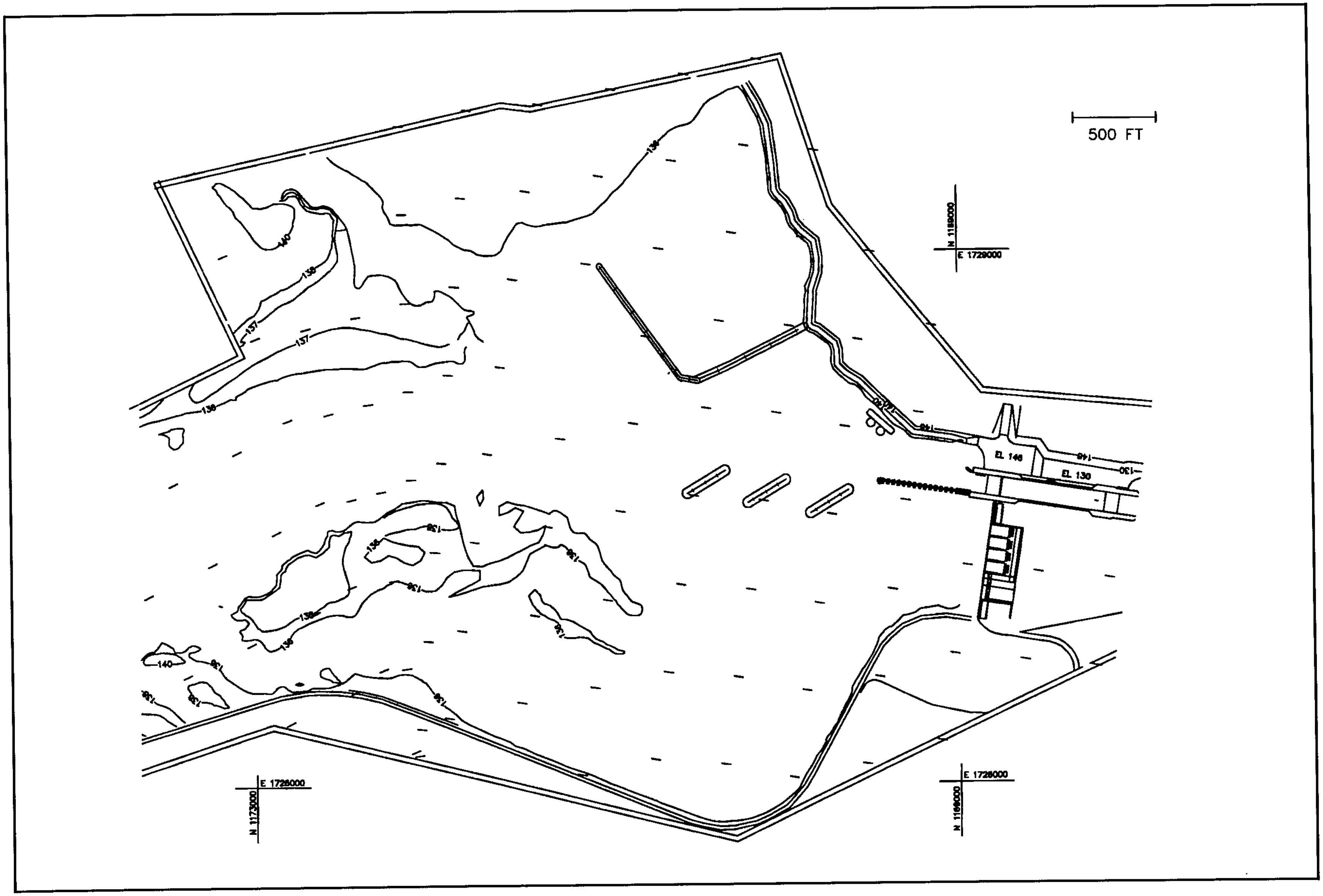


Figure 13. Preliminary experiments, van dike Configuration 2

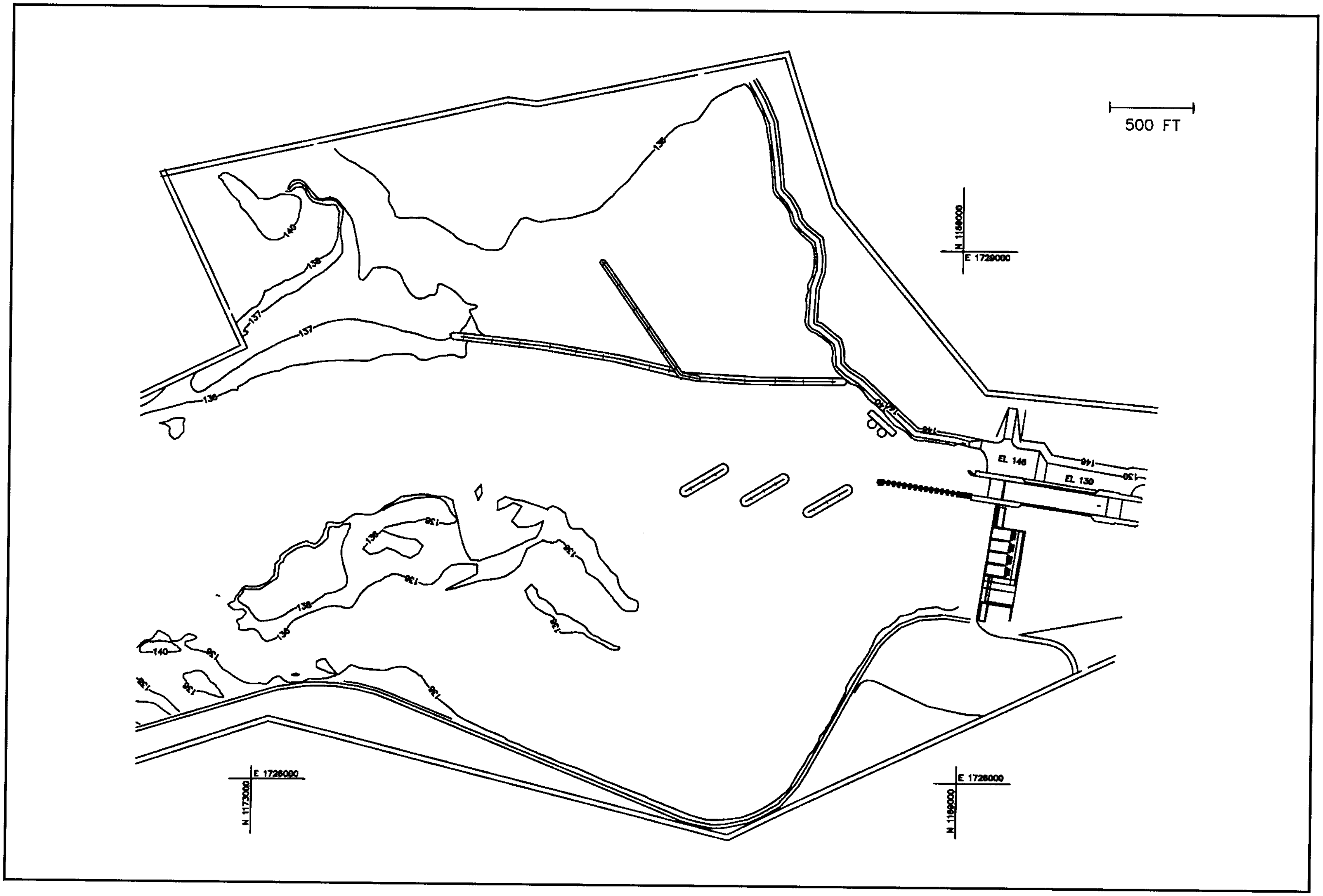


Figure 14. Preliminary experiments, vane dike Configuration 3

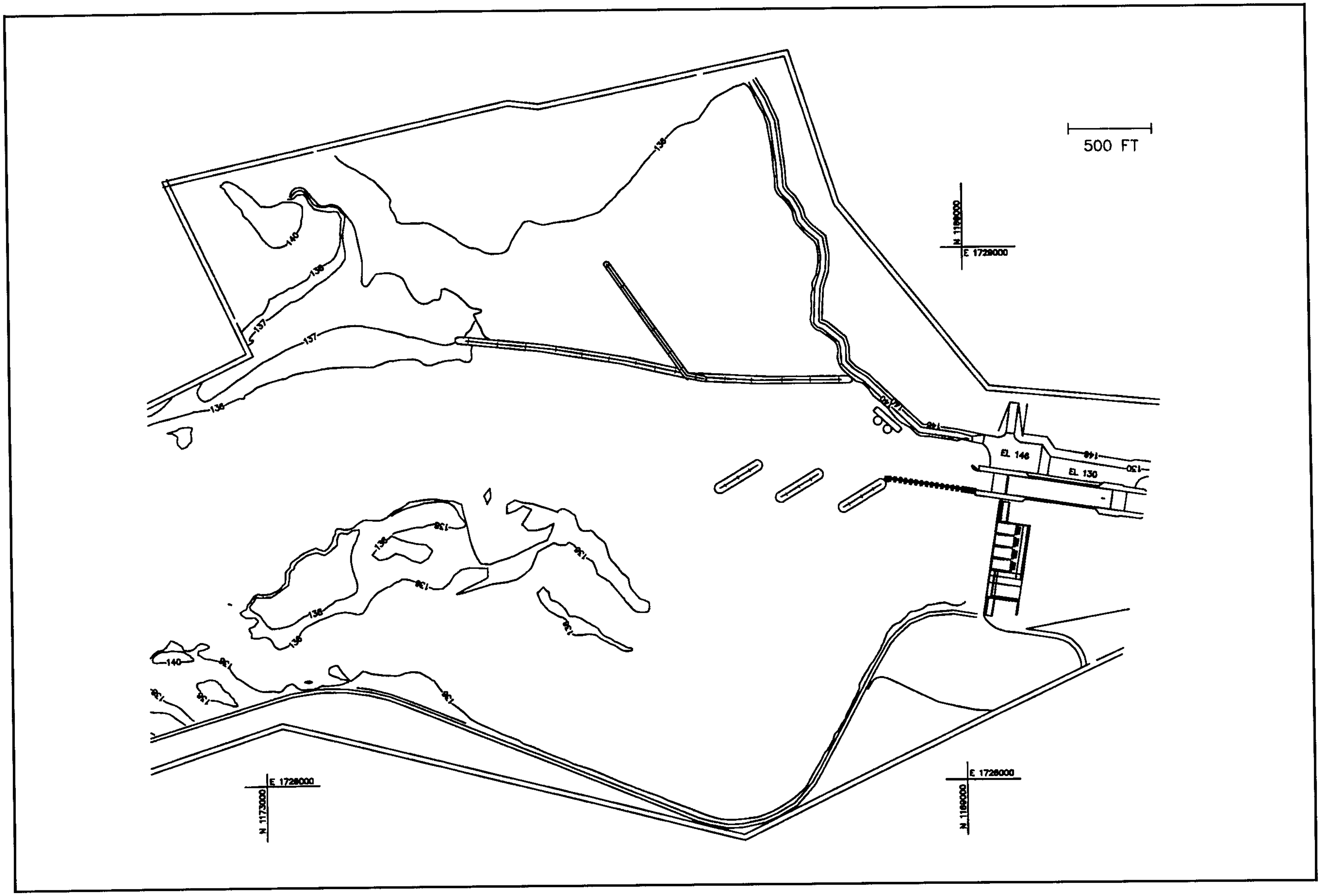


Figure 15. Preliminary experiments, vane dike Configuration 4

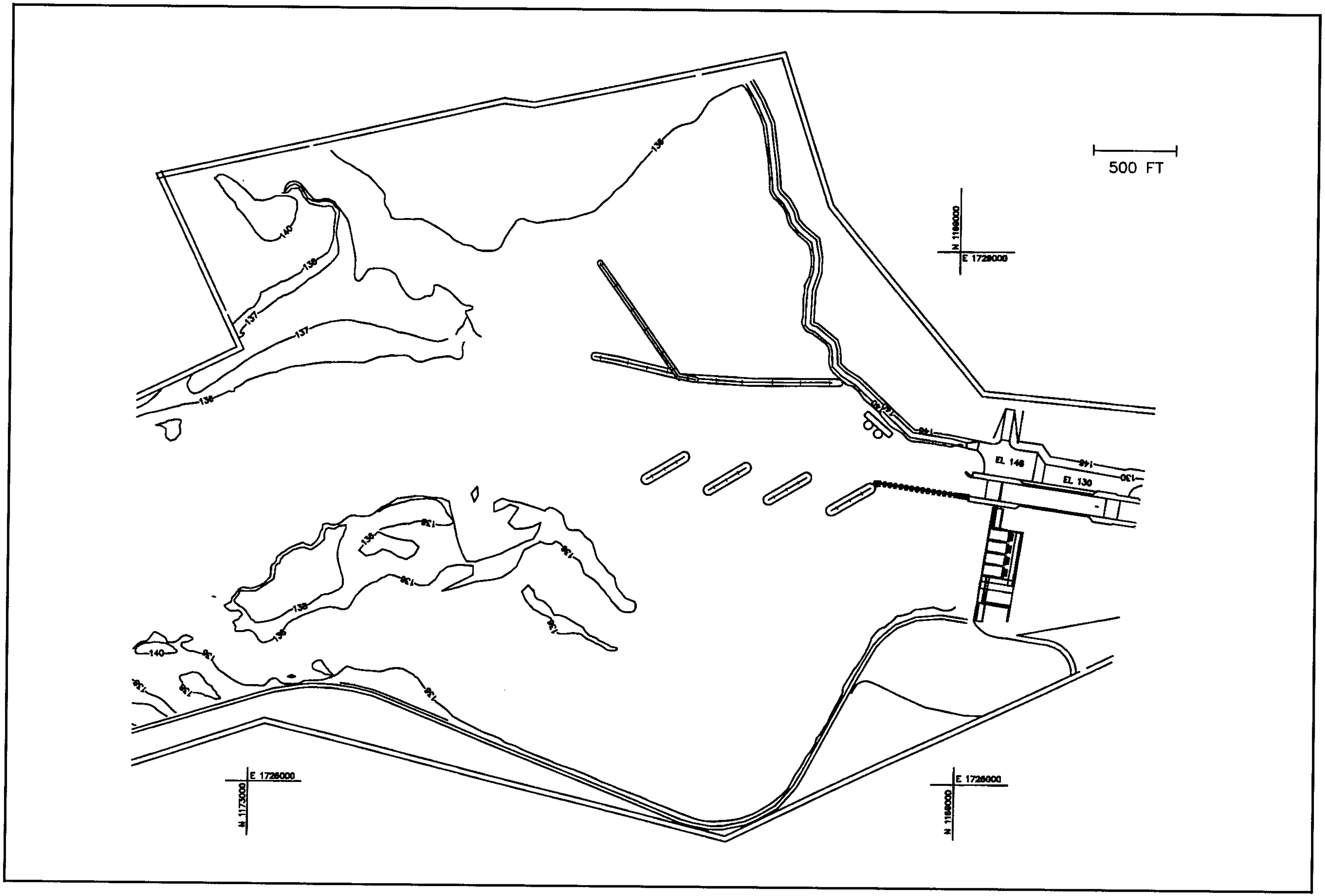


Figure 16. Preliminary experiments, vane dike Configuration 5

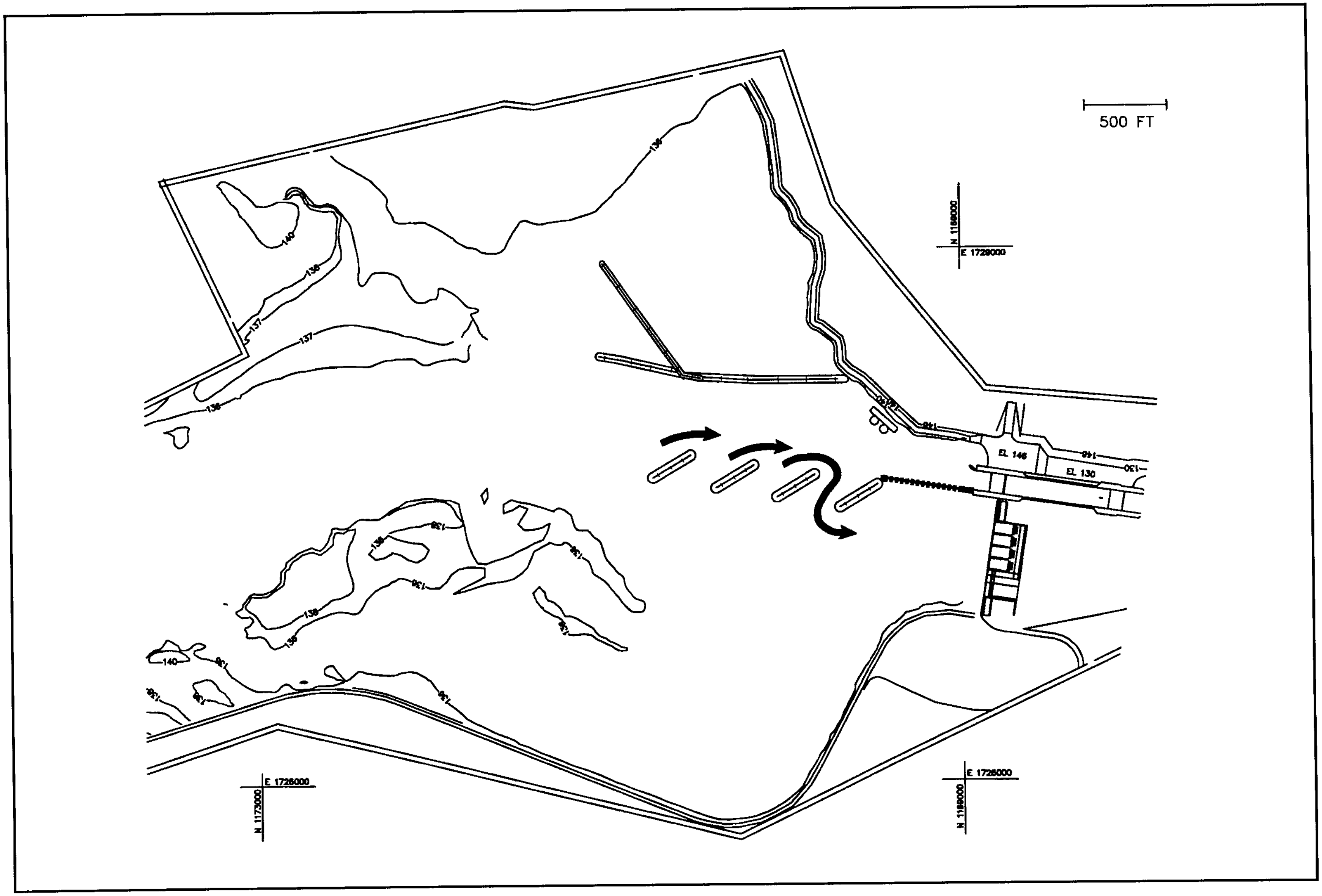


Figure 17. Dye flow for vane dike Configuration 5

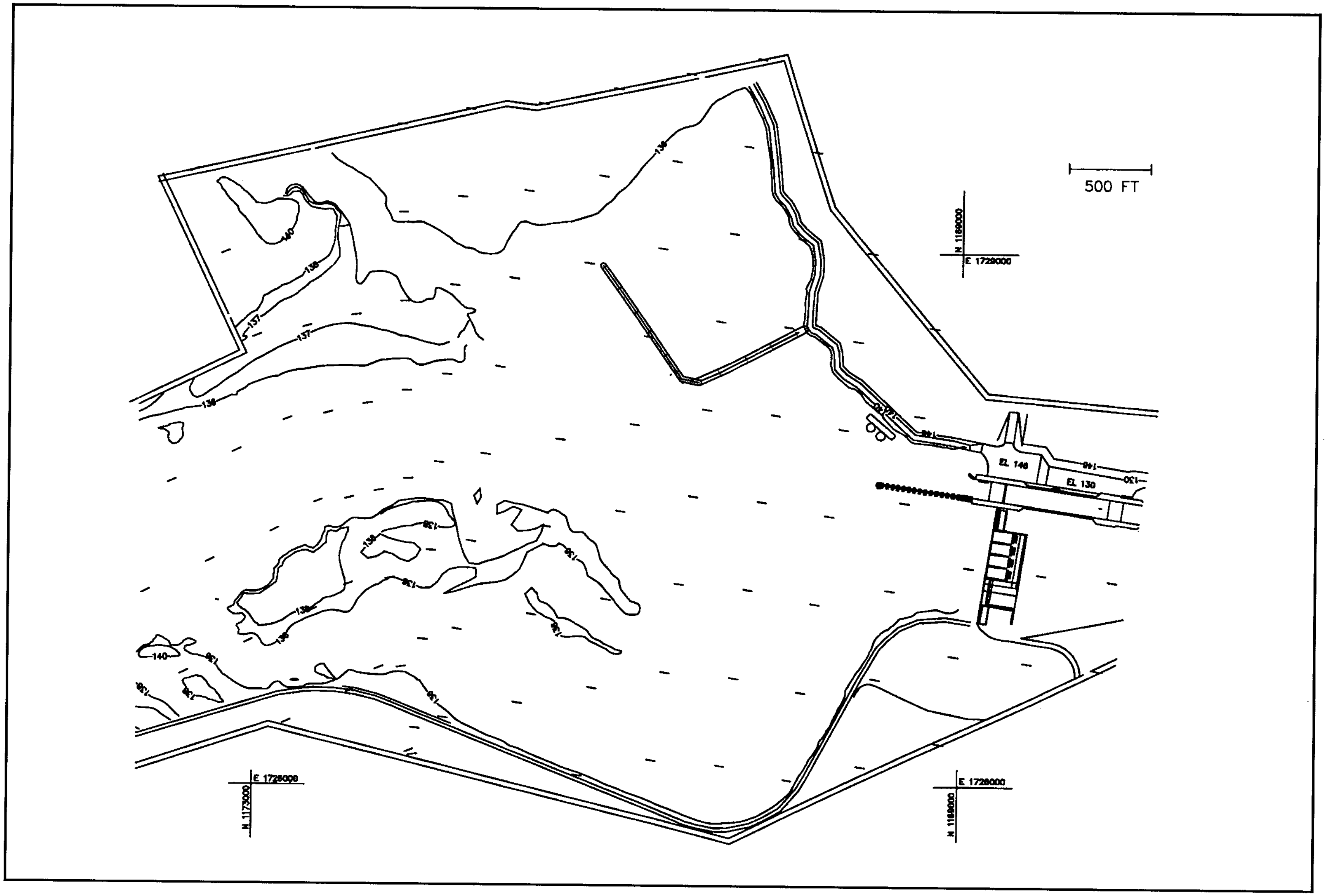


Figure 18. Preliminary experiments, short downstream levee

Figure 19. Preliminary experiments, eddies from backwater closure

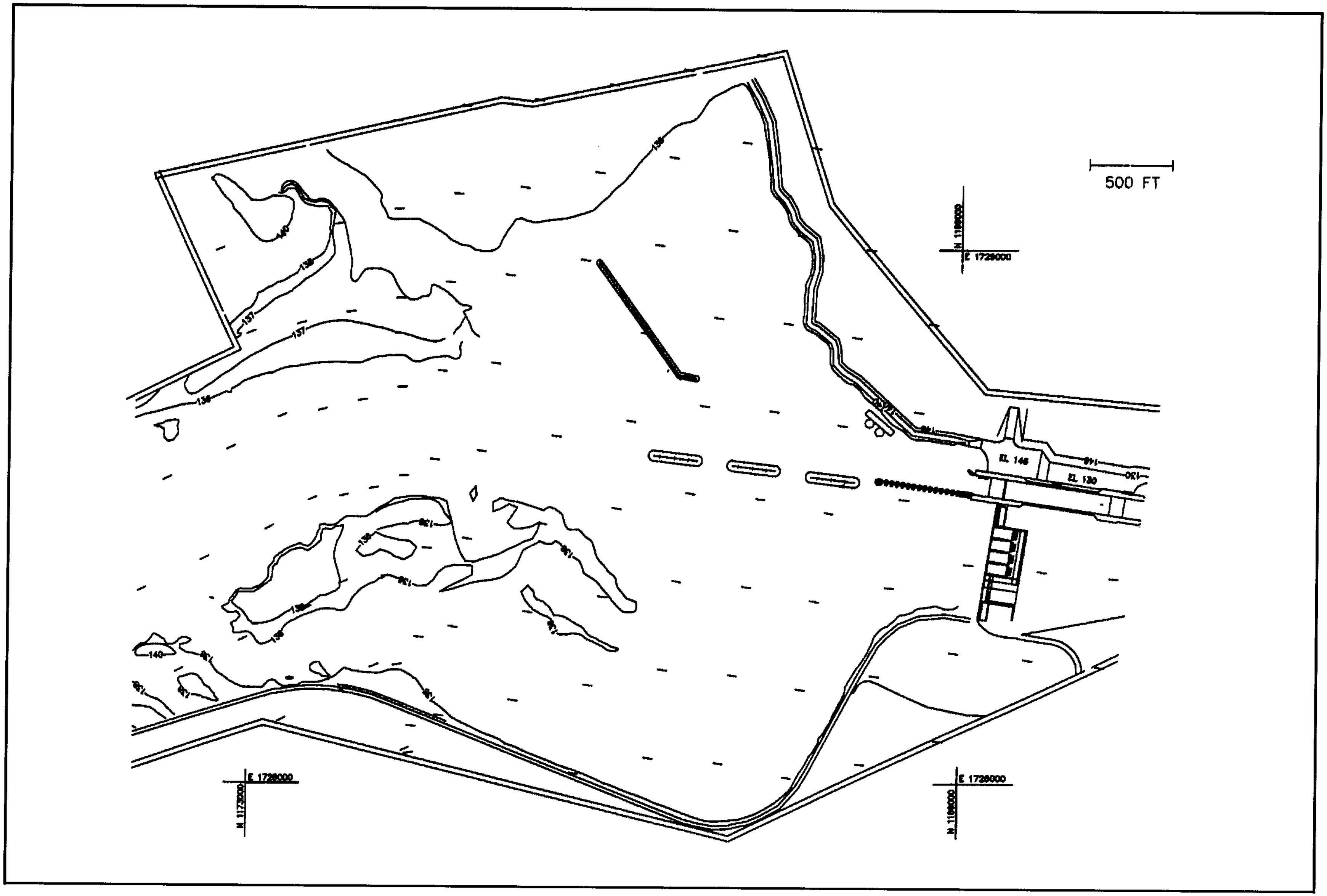


Figure 20. Preliminary experiments, vane dike Configuration 6

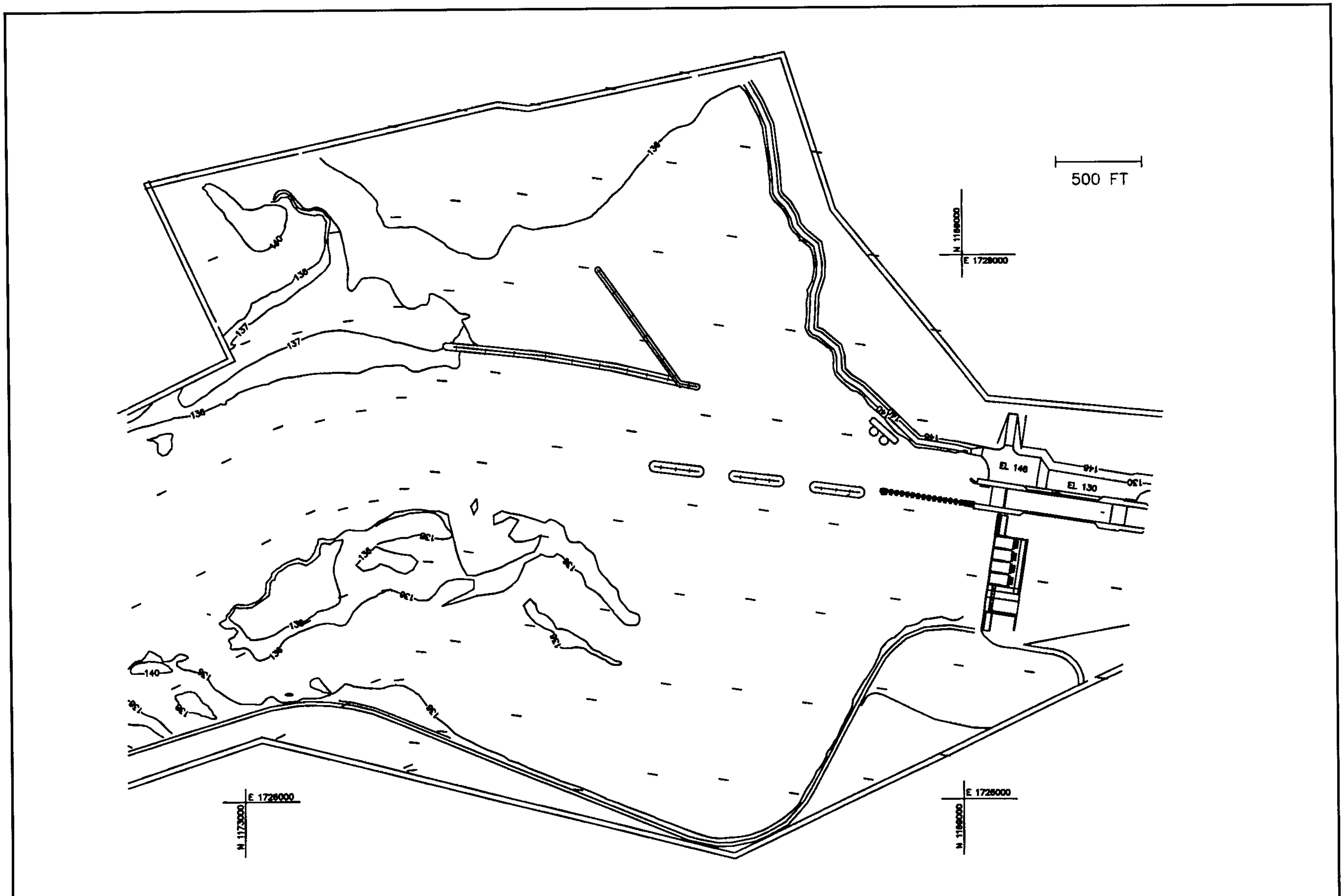


Figure 21. Preliminary experiments, vane dike Configuration 7

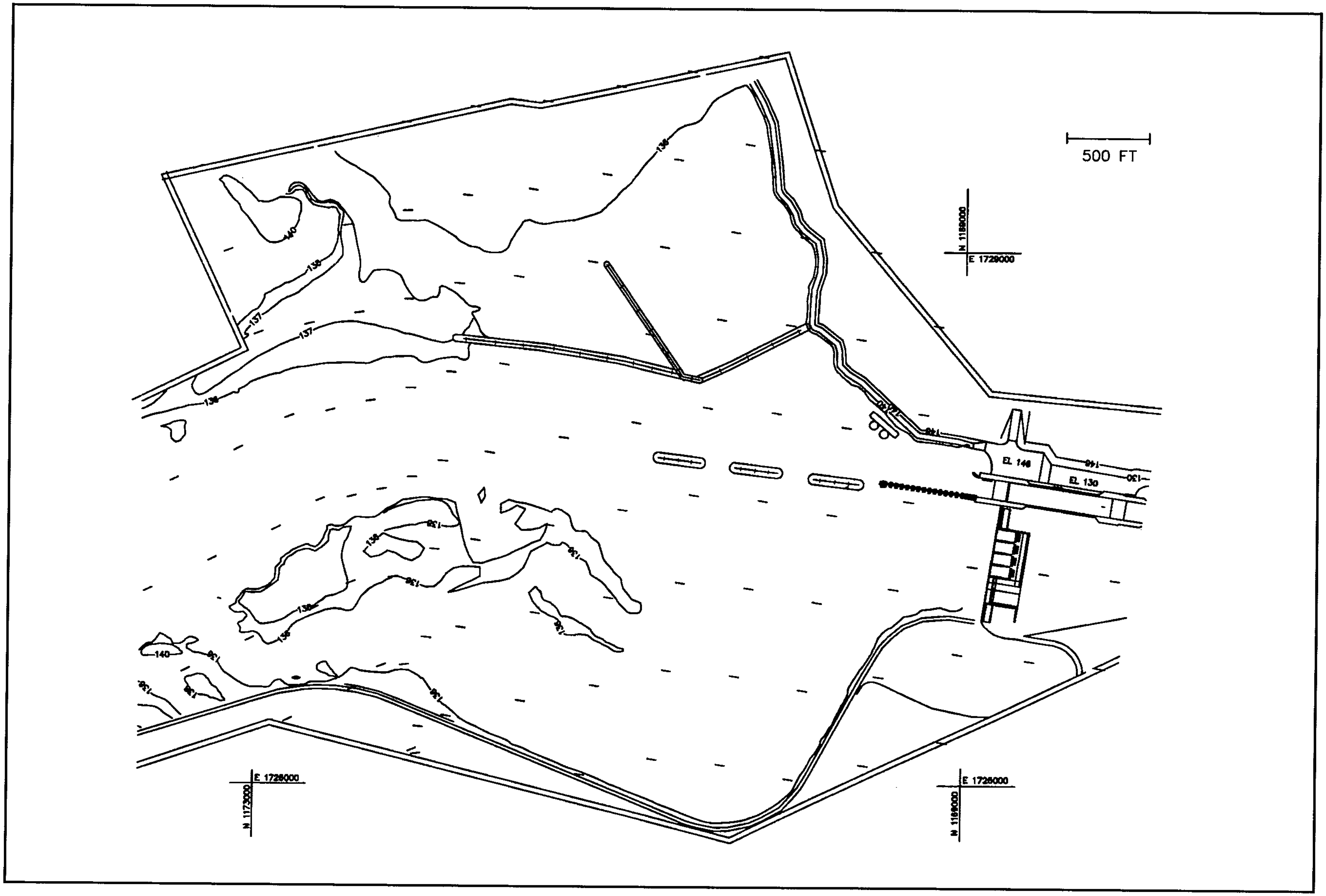


Figure 22. Preliminary experiments, vane dike Configuration 8

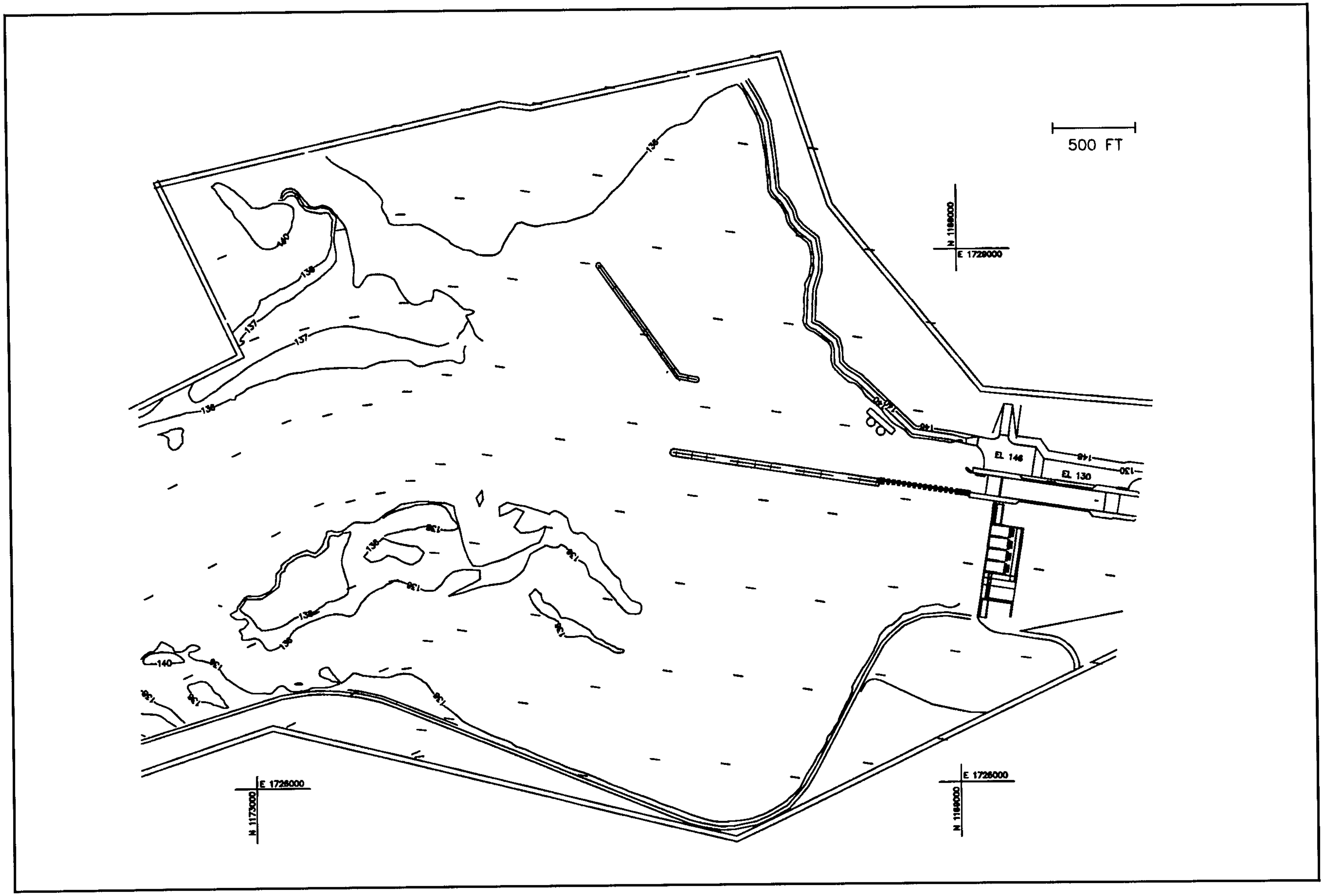


Figure 23. Preliminary experiments, guard wall extension

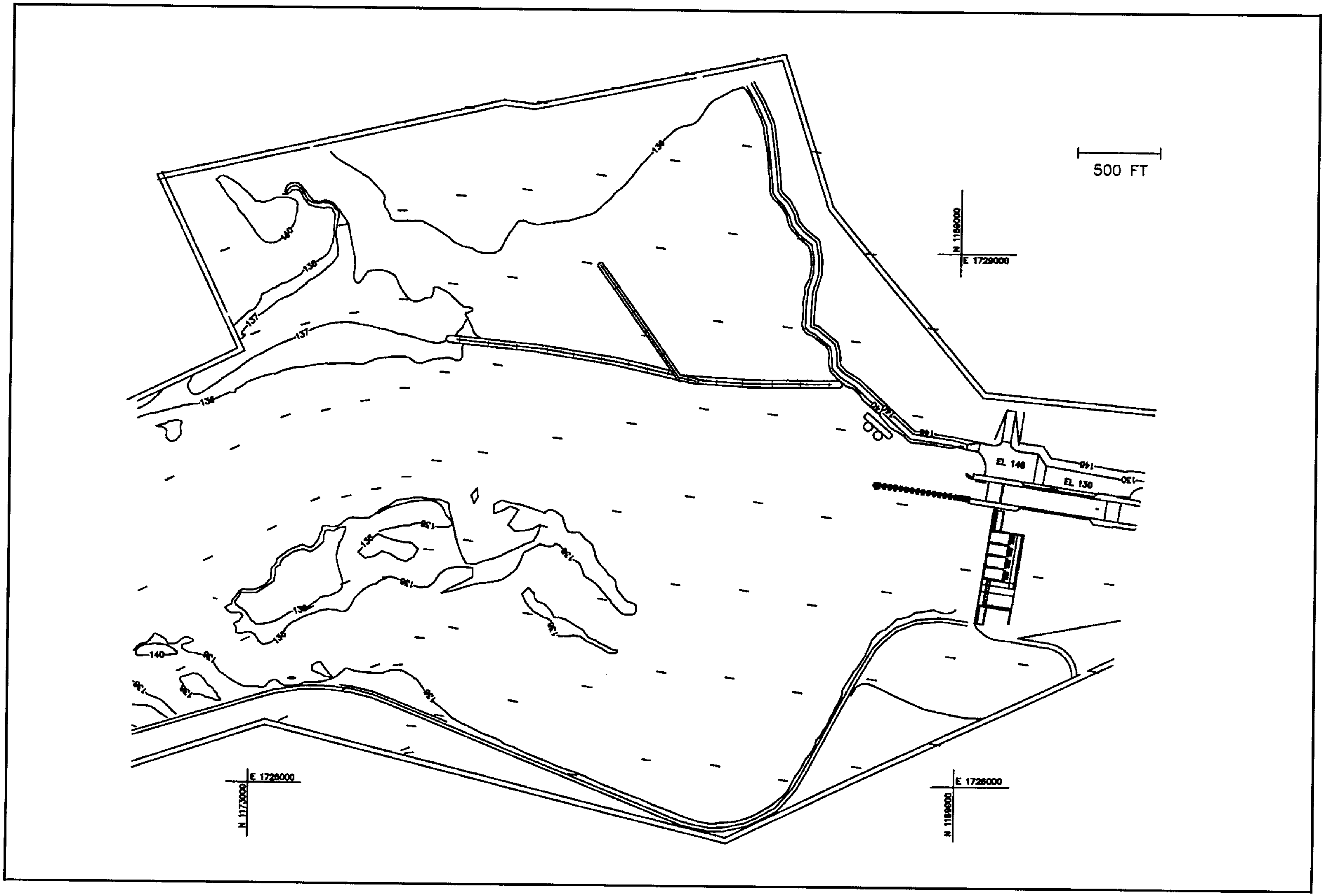


Figure 24. Preliminary experiments, bank reconstruction Configuration 1

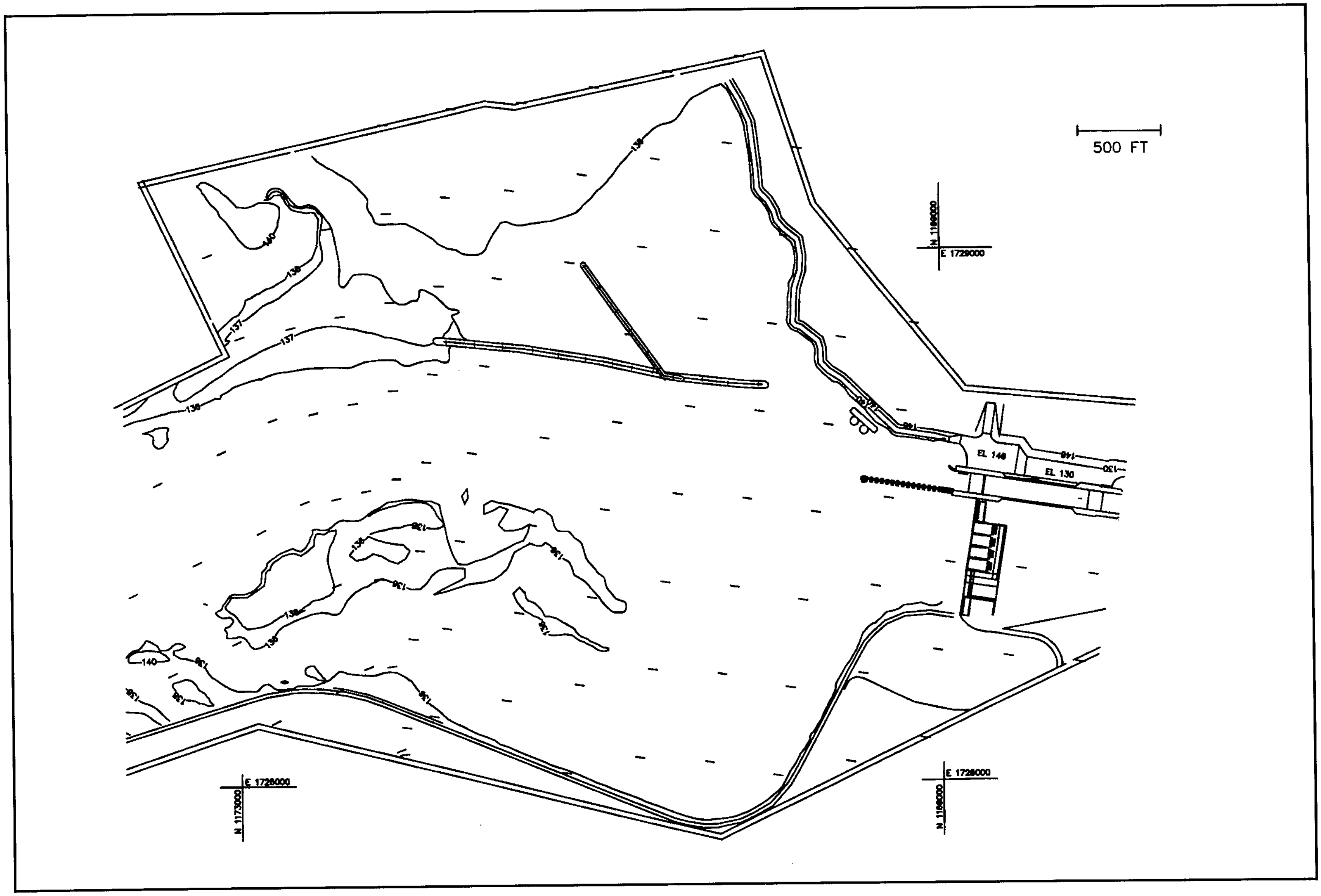


Figure 25. Preliminary experiments, bank reconstruction Configuration 2

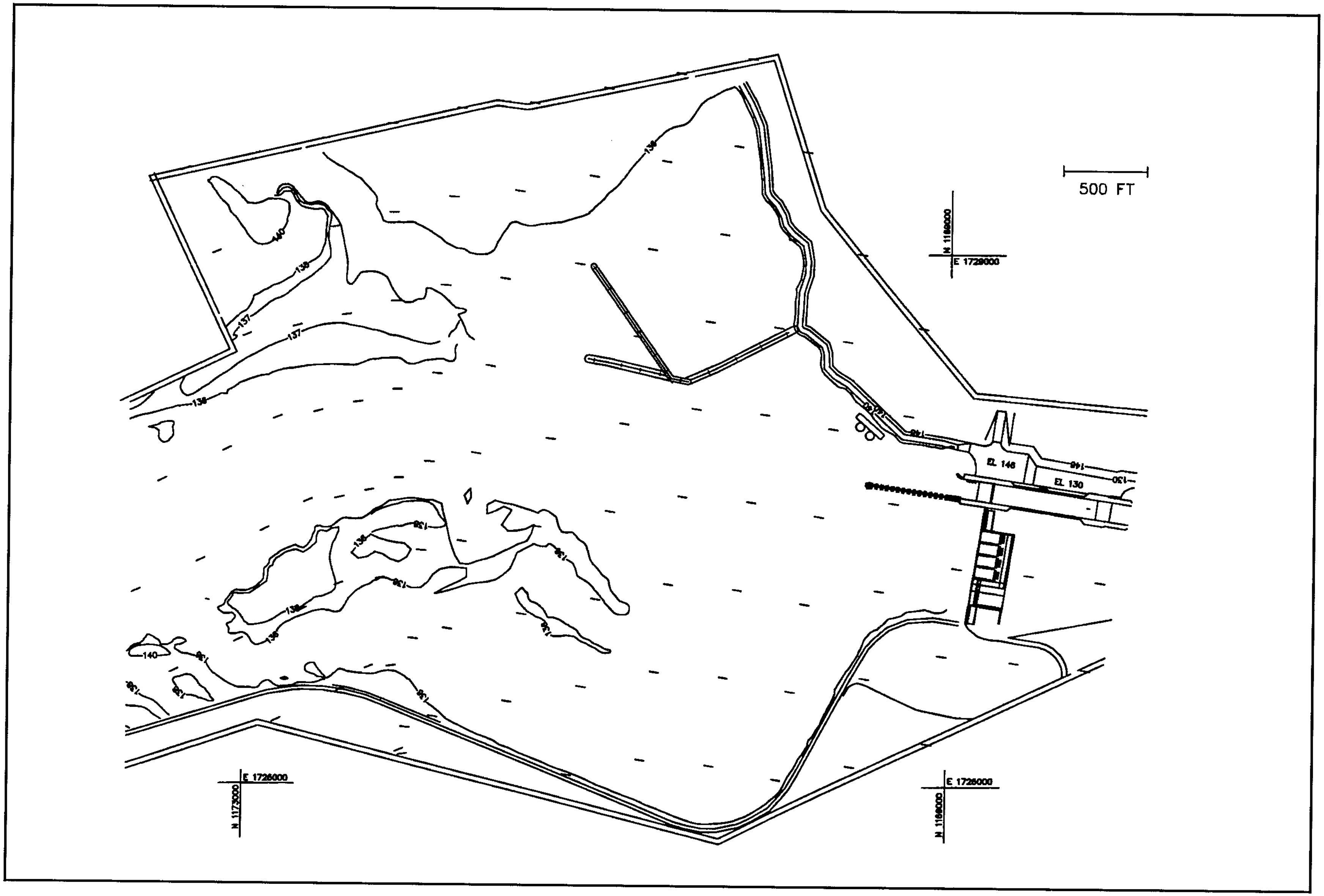


Figure 26. Preliminary experiments, bank reconstruction Configuration 3

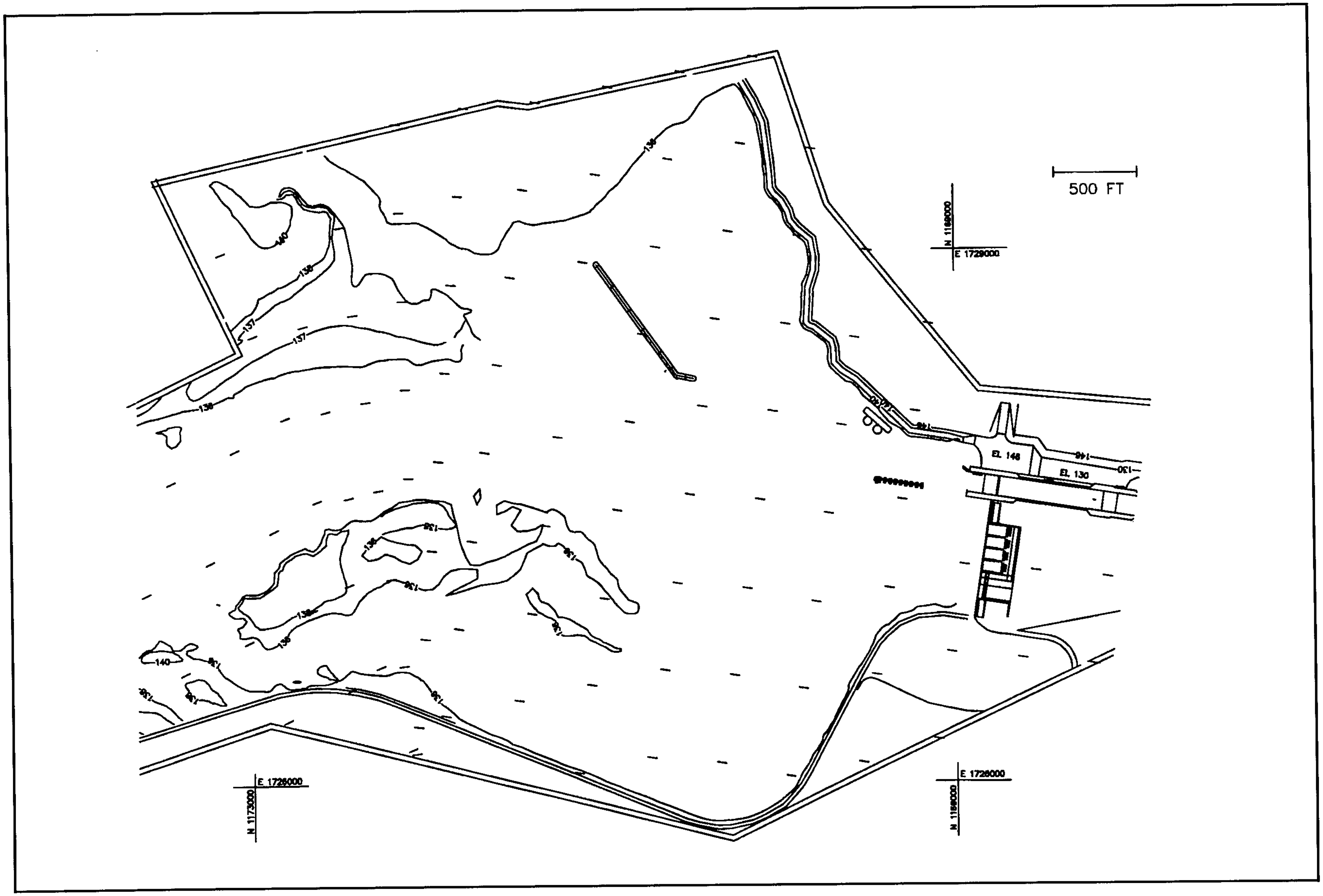


Figure 27. Preliminary experiments, partial guard wall removal

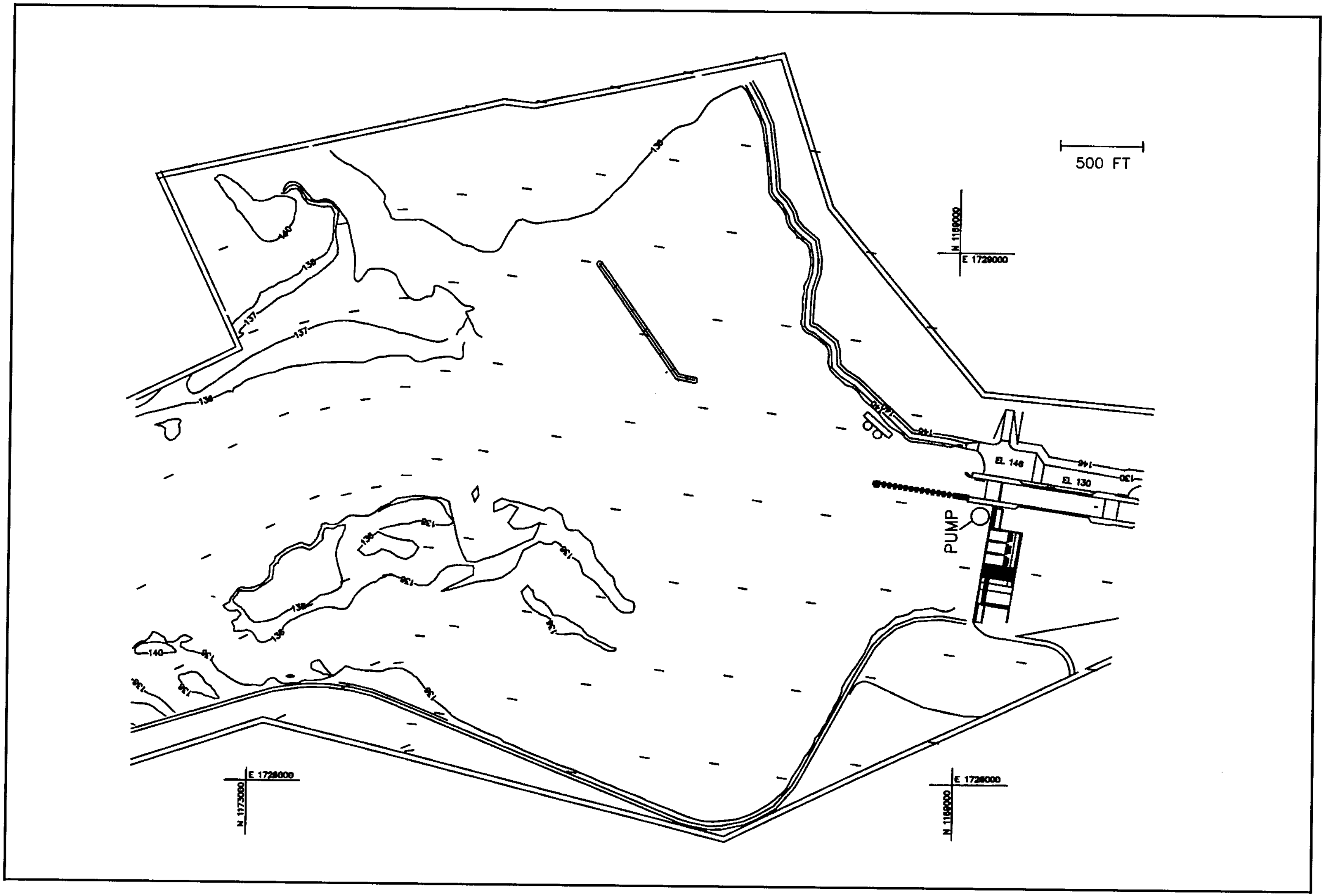


Figure 28. Preliminary experiments, repositioning of Gate 1

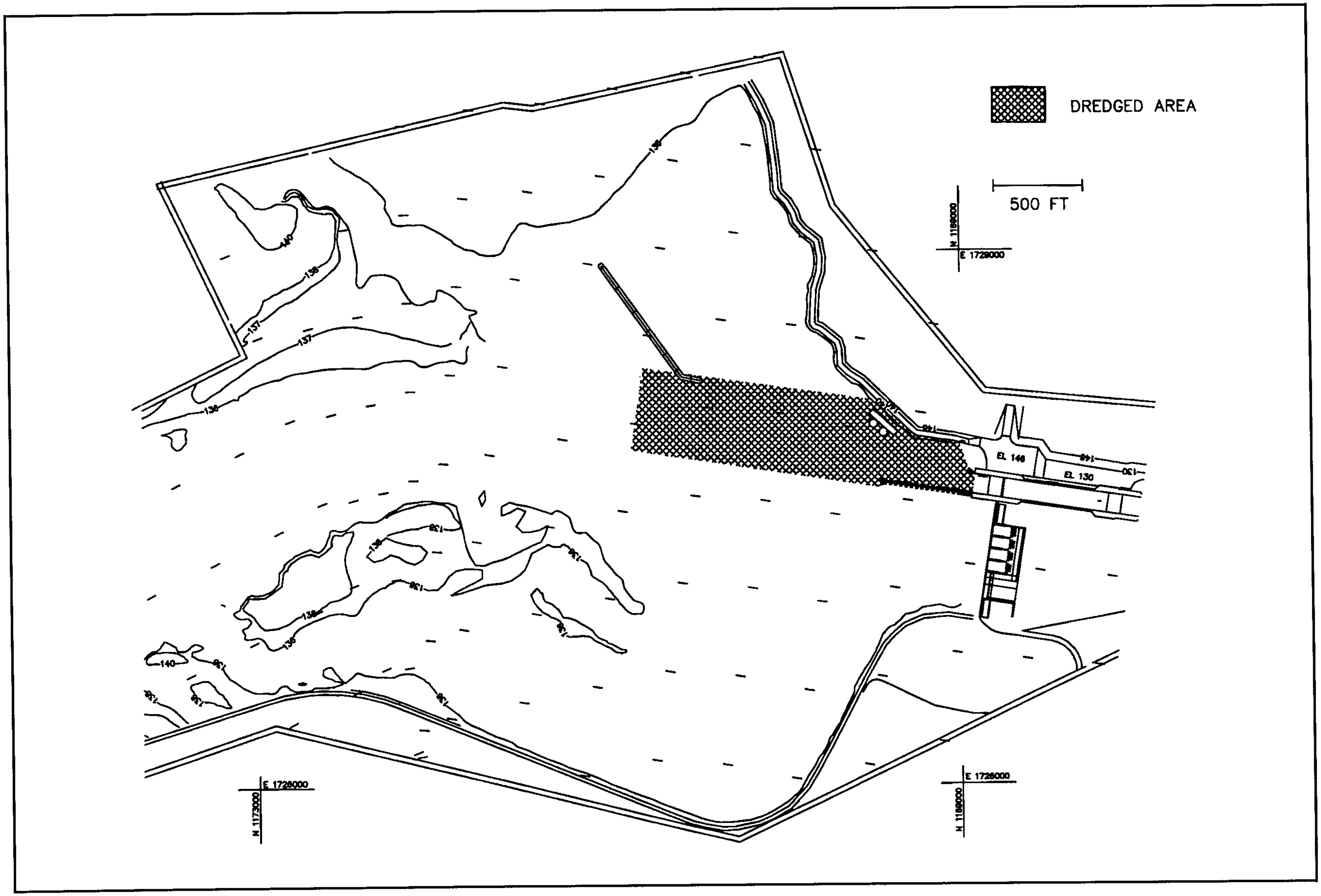


Figure 29. Preliminary experiments, lock entrance dredged

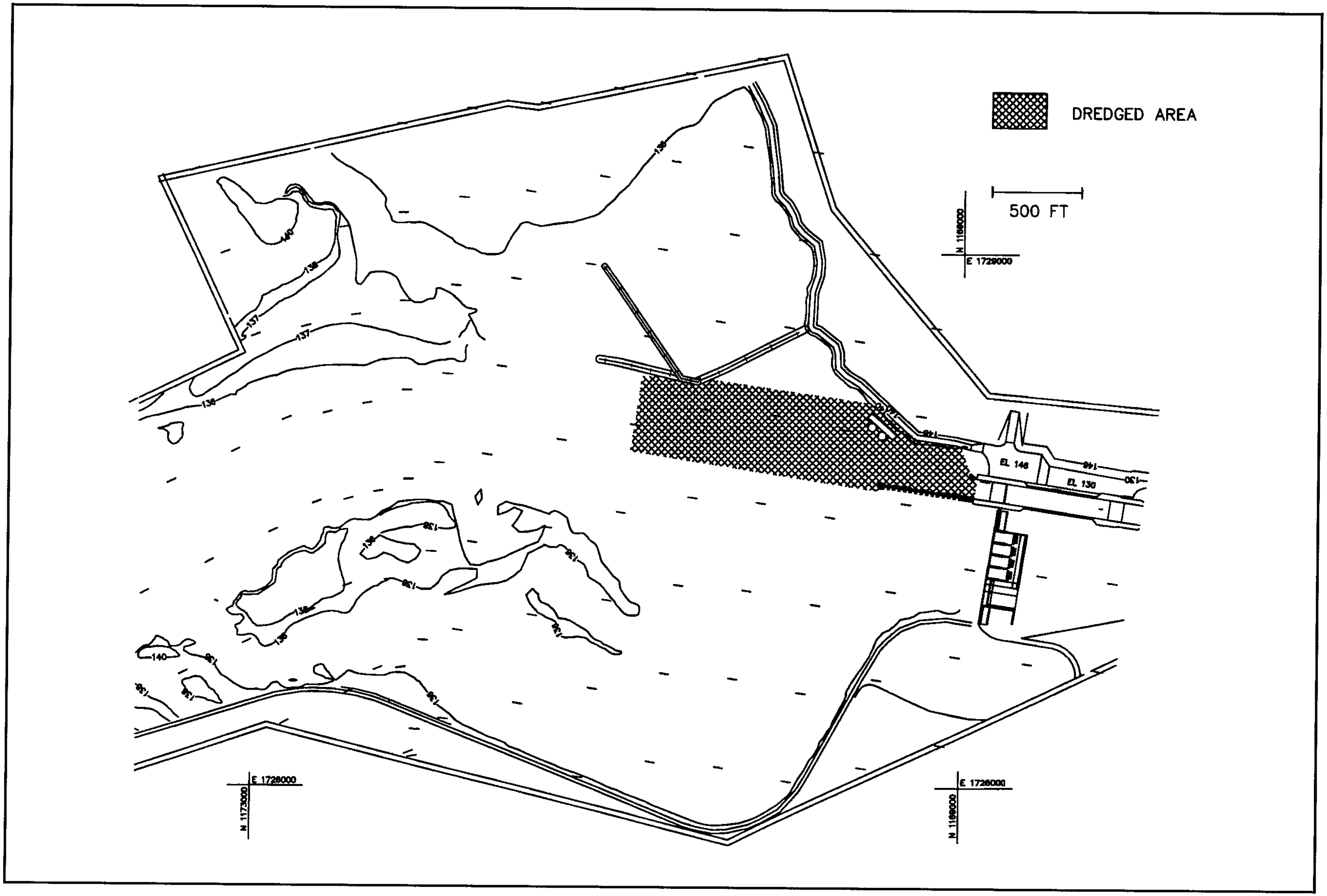


Figure 30. Preliminary experiments, lock entrance dredged Variation 1

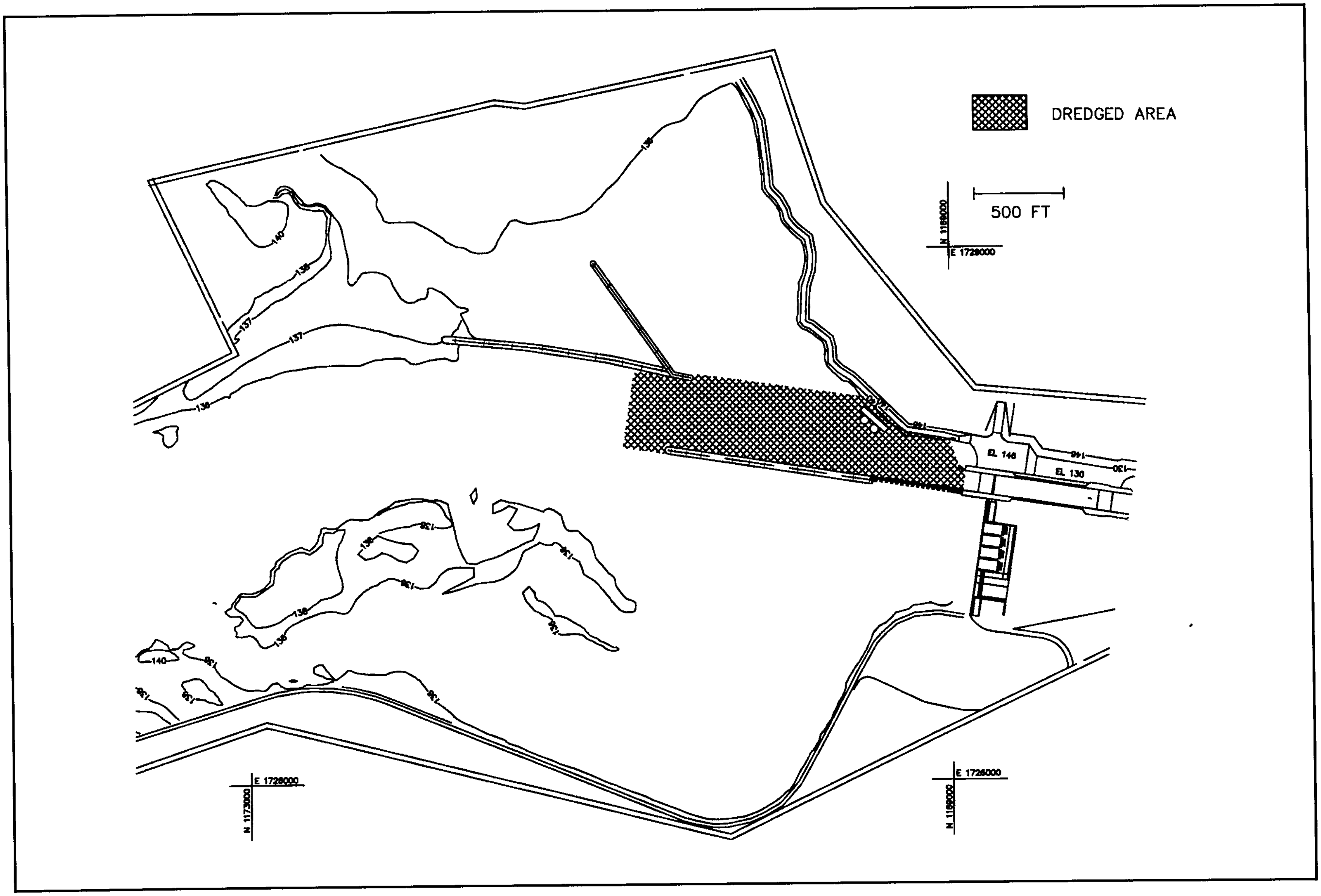


Figure 31. Preliminary experiments, lock entrance dredged Variation 2

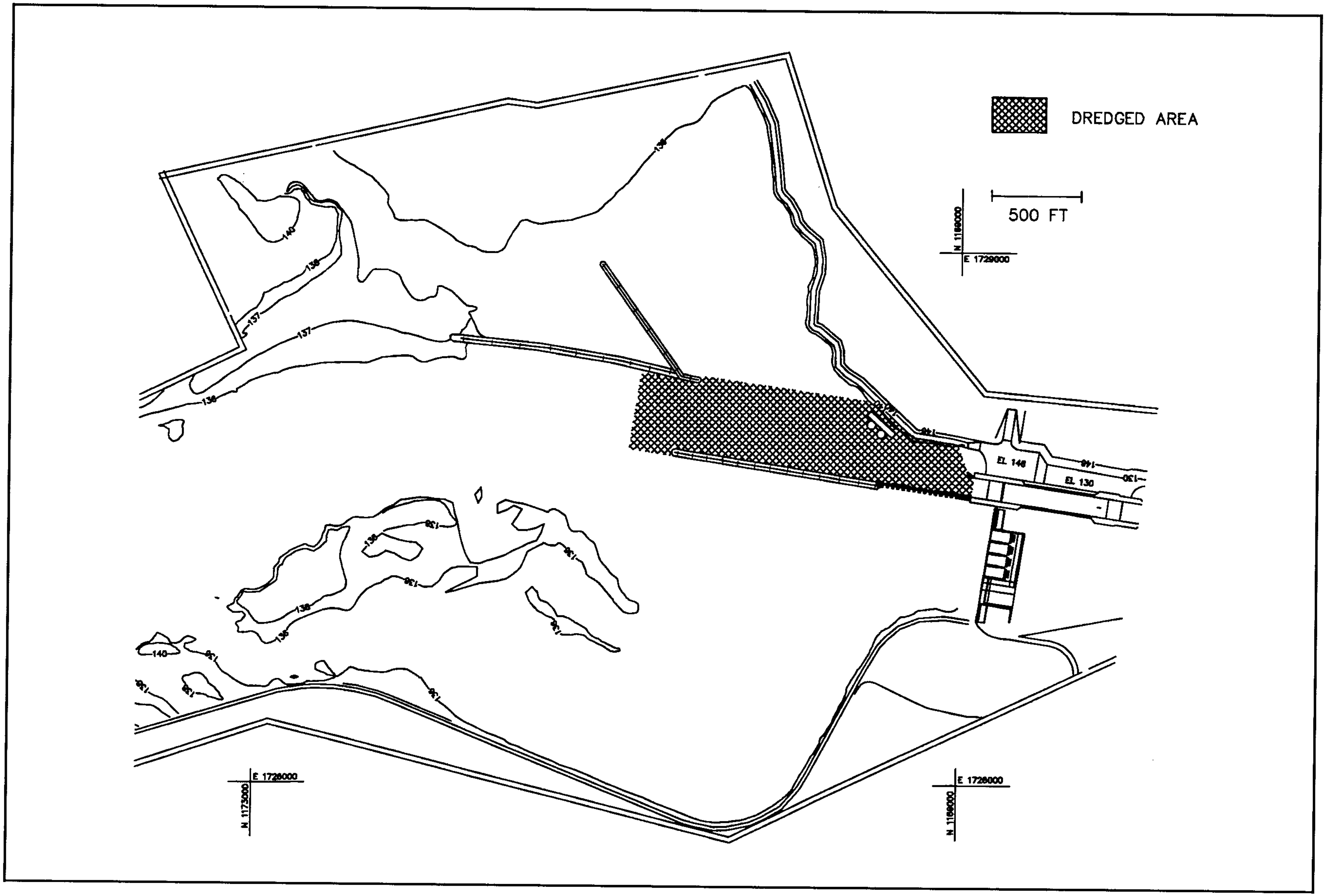


Figure 32. Preliminary experiments, lock entrance dredged Variation 3

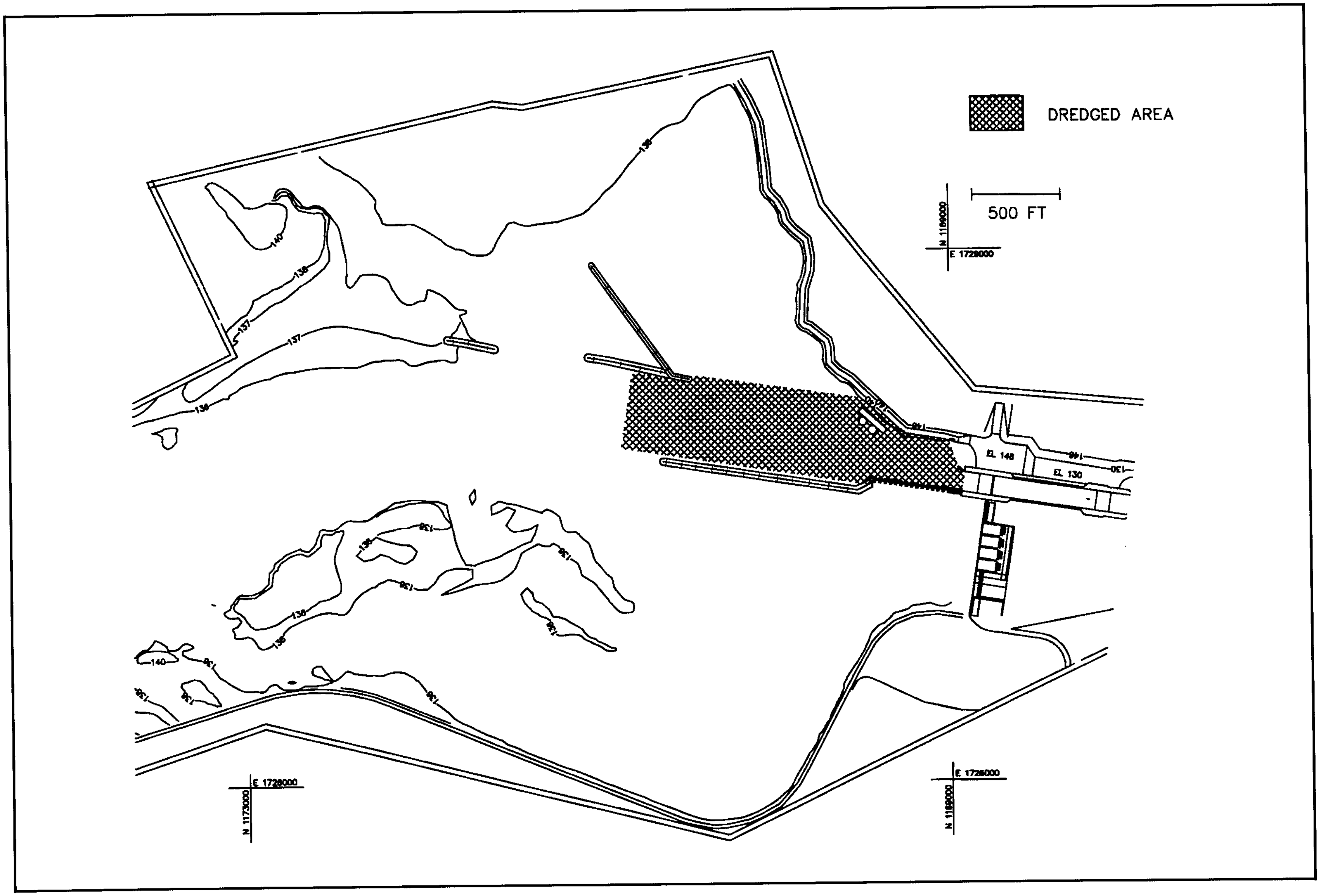


Figure 33. Preliminary experiments, lock entrance dredged Variation 4

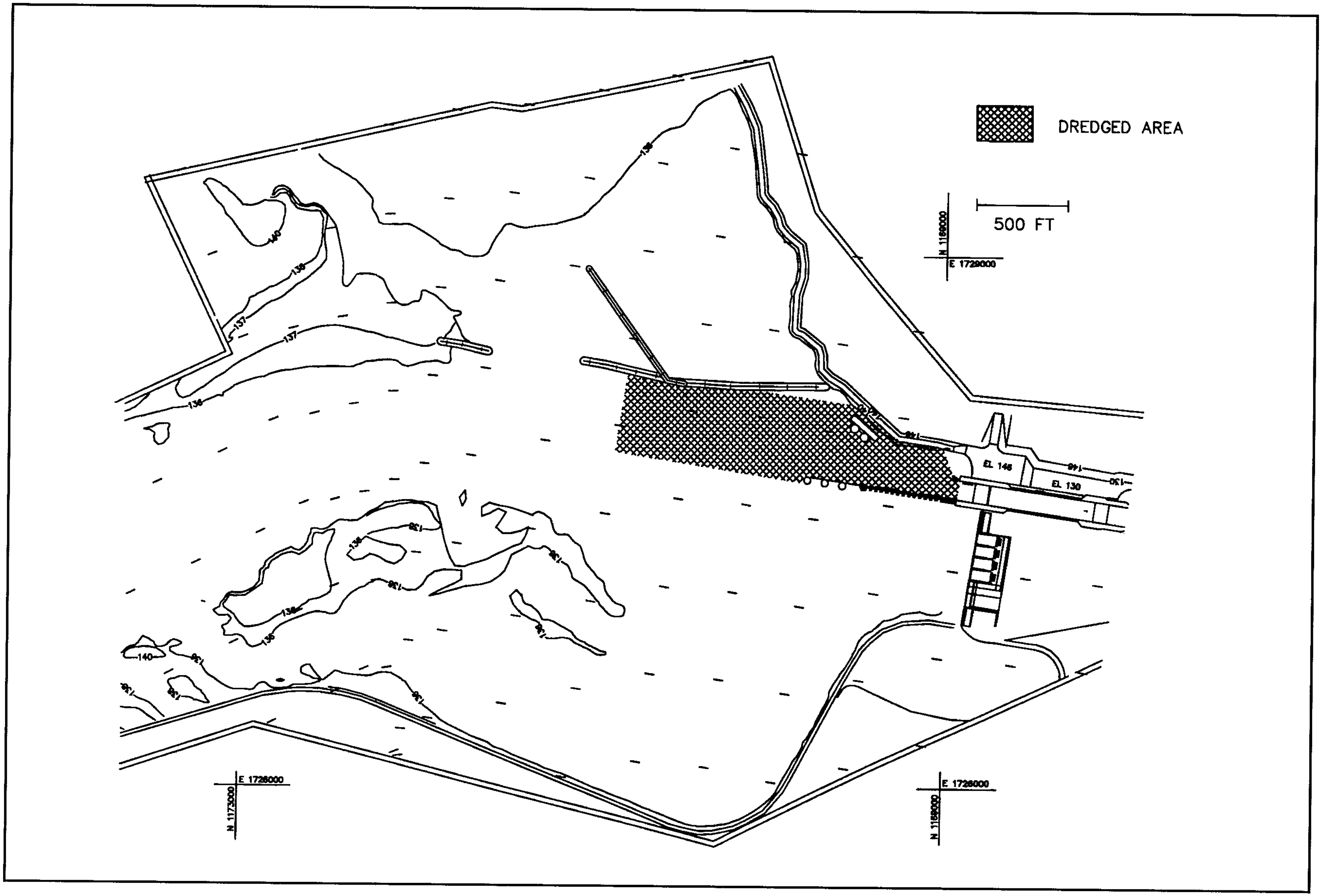


Figure 34. Preliminary experiments, coffer cell extension

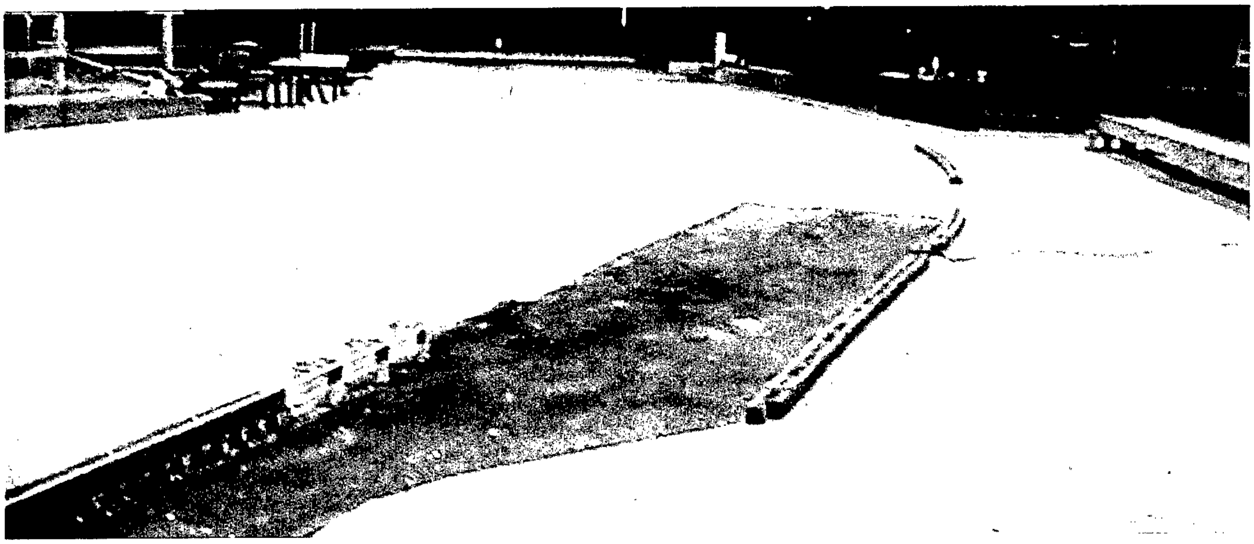
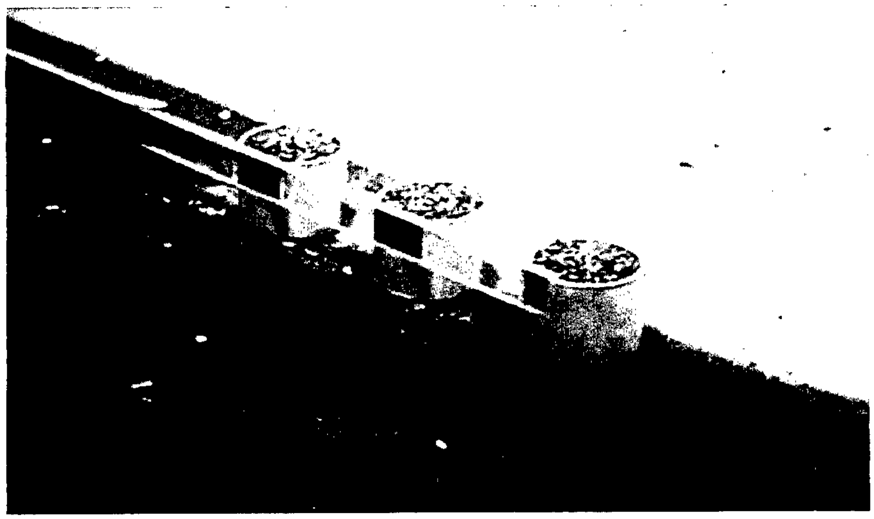


Figure 35. Coffer cell extension, no skirts

Figure 36. Preliminary coffer cell extension



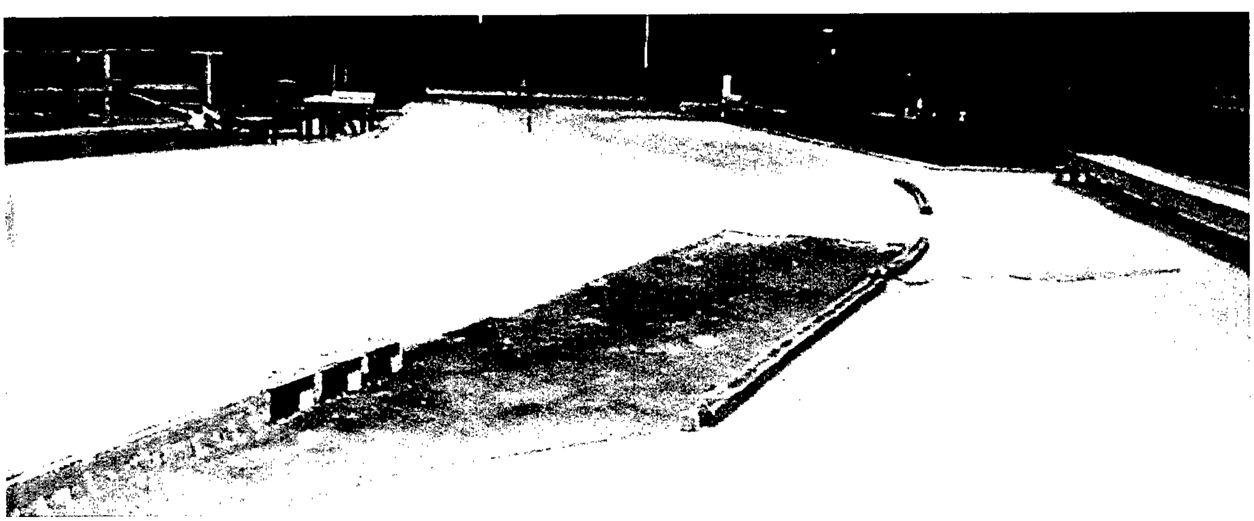


Figure 37. Coffer cell extension with skirts

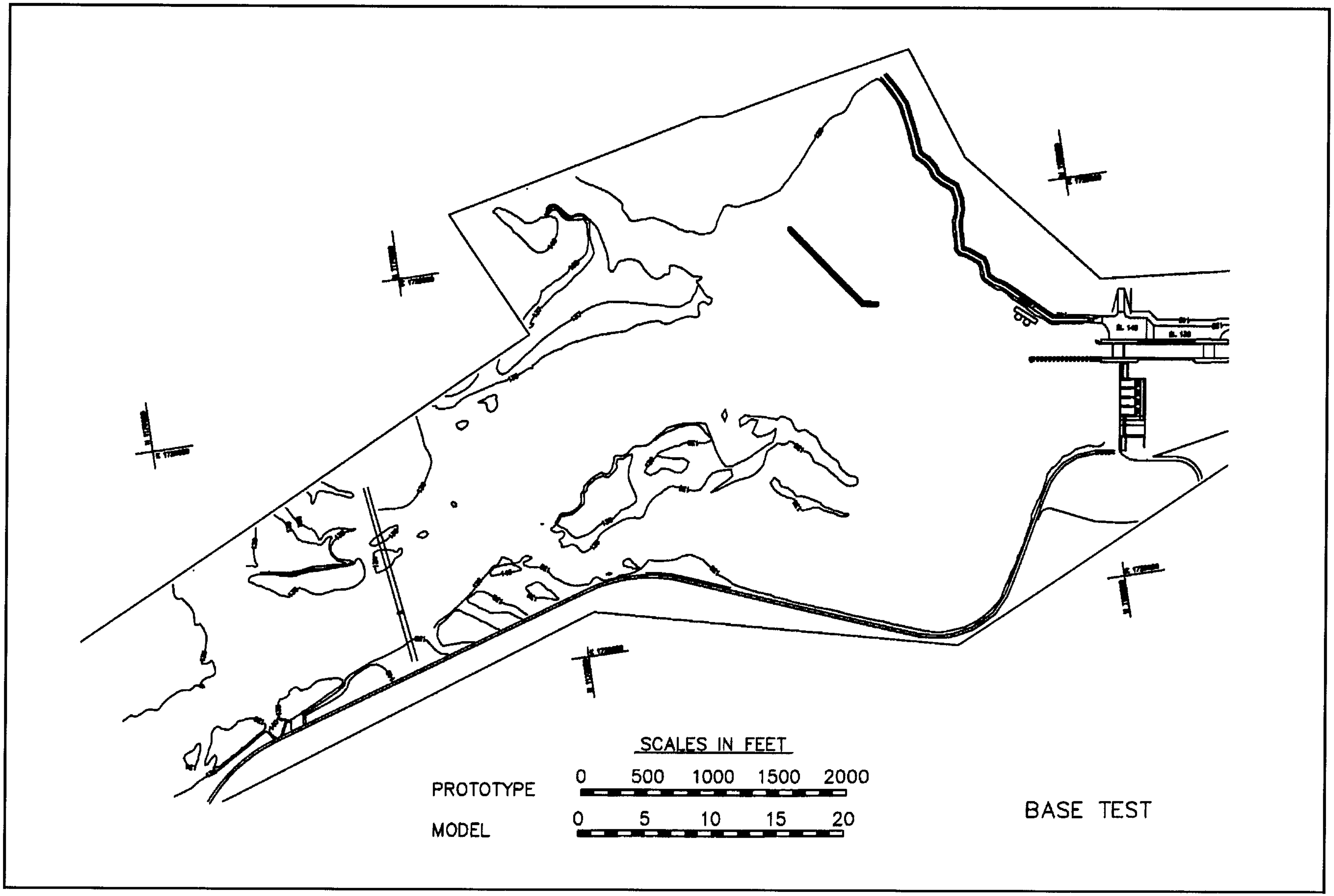


Figure 38. Base Test Condition

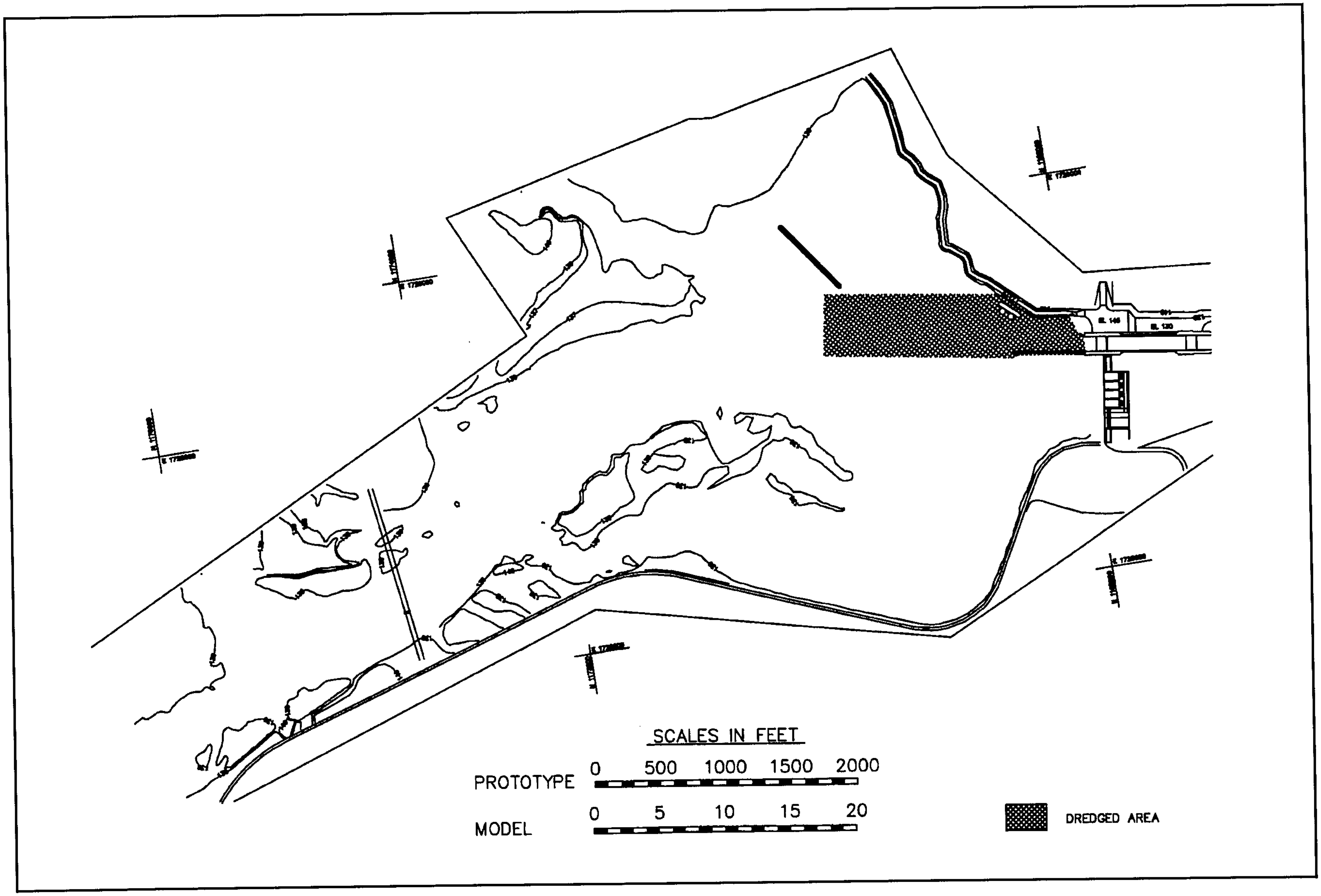


Figure 39. Plan 1 condition

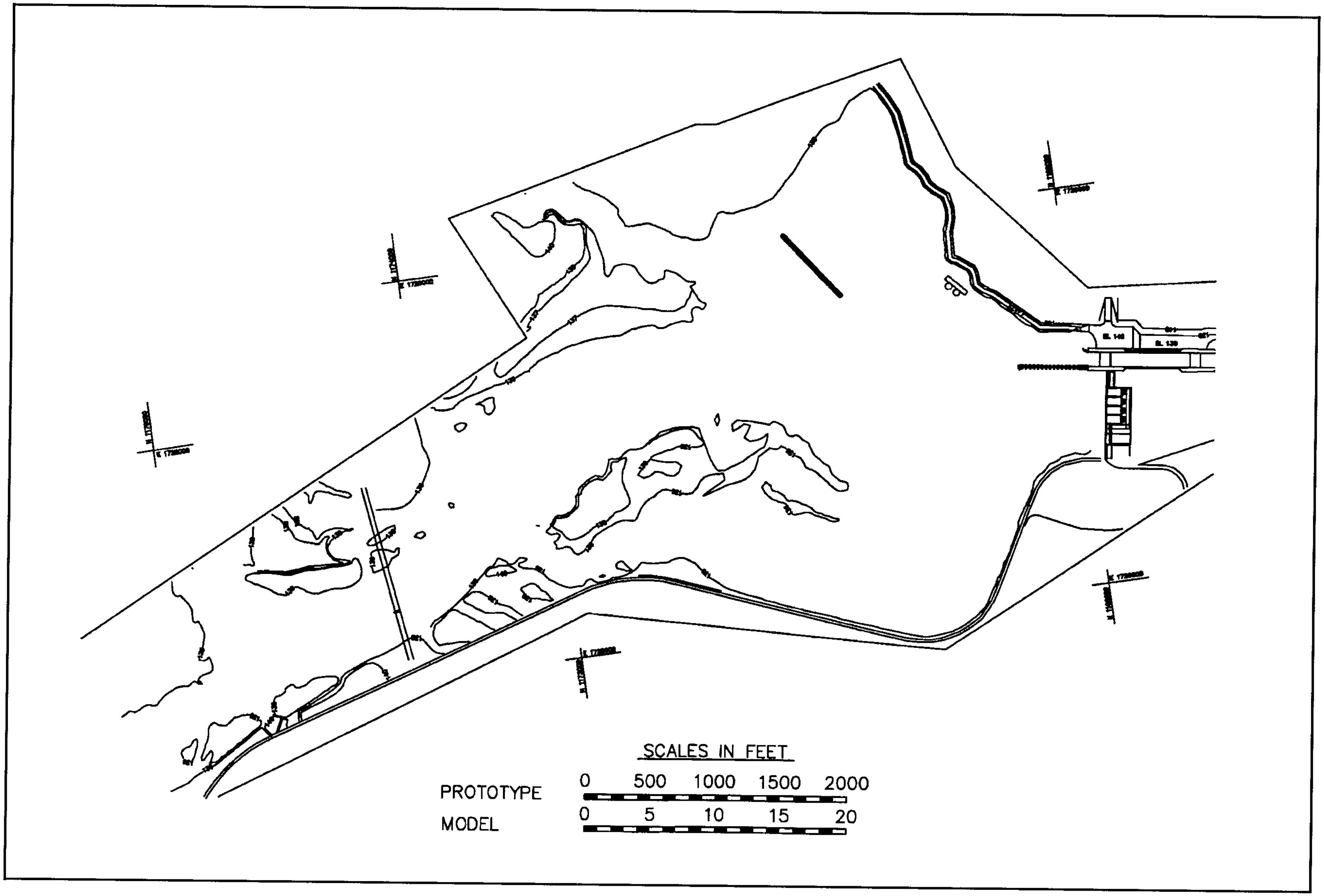


Figure 40. Plan 2 condition

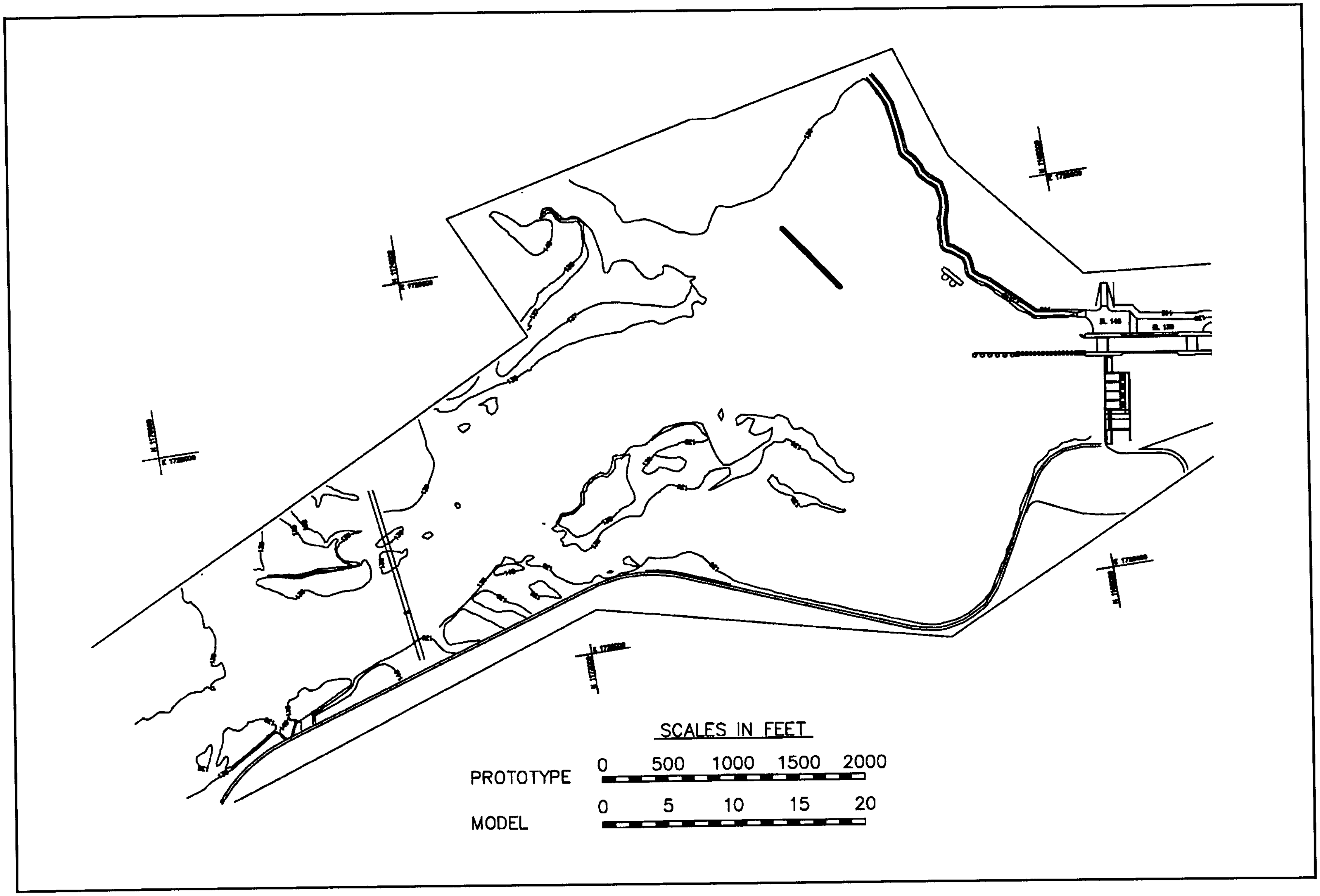


Figure 41. Plan 3 condition

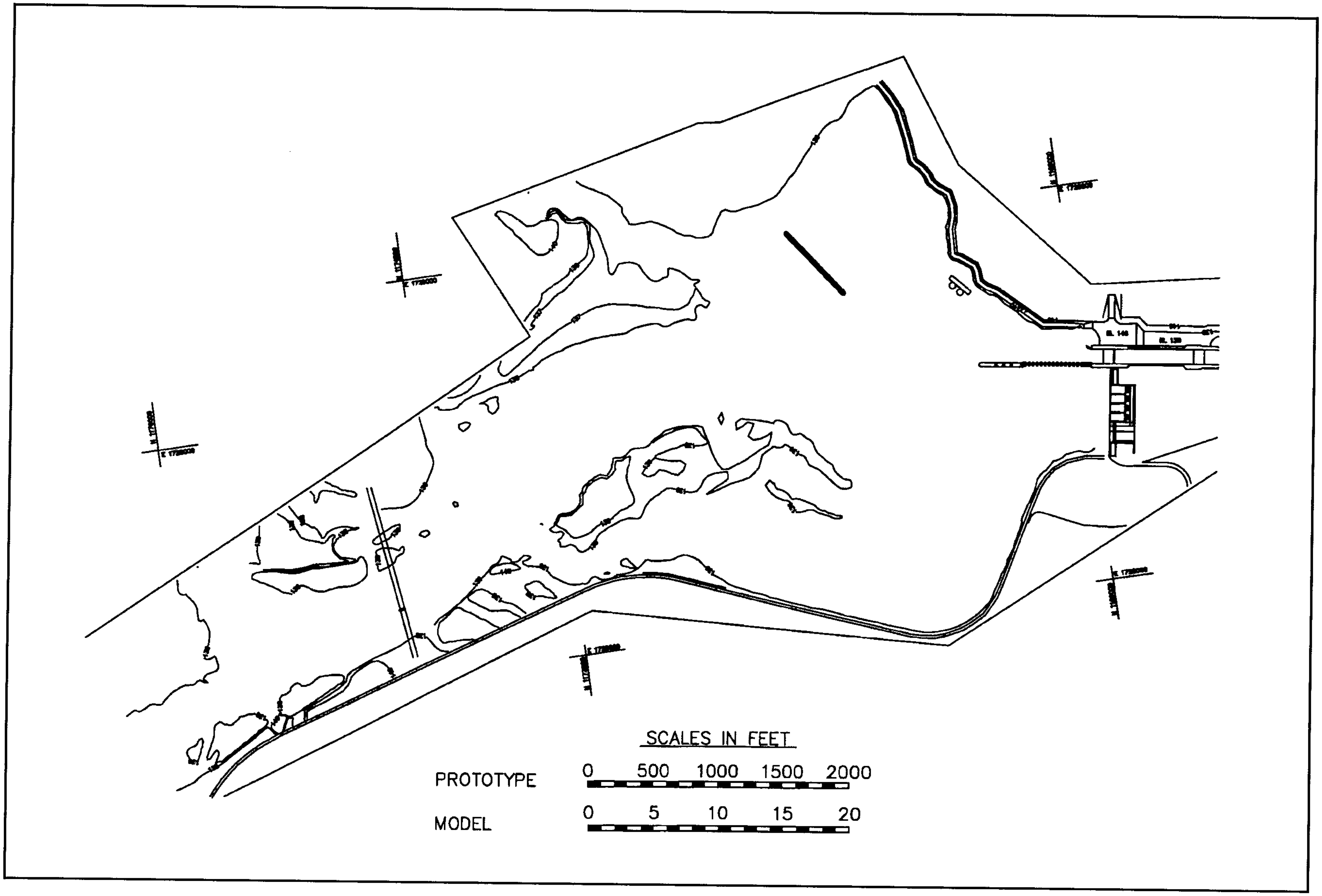


Figure 42. Plan 4 condition

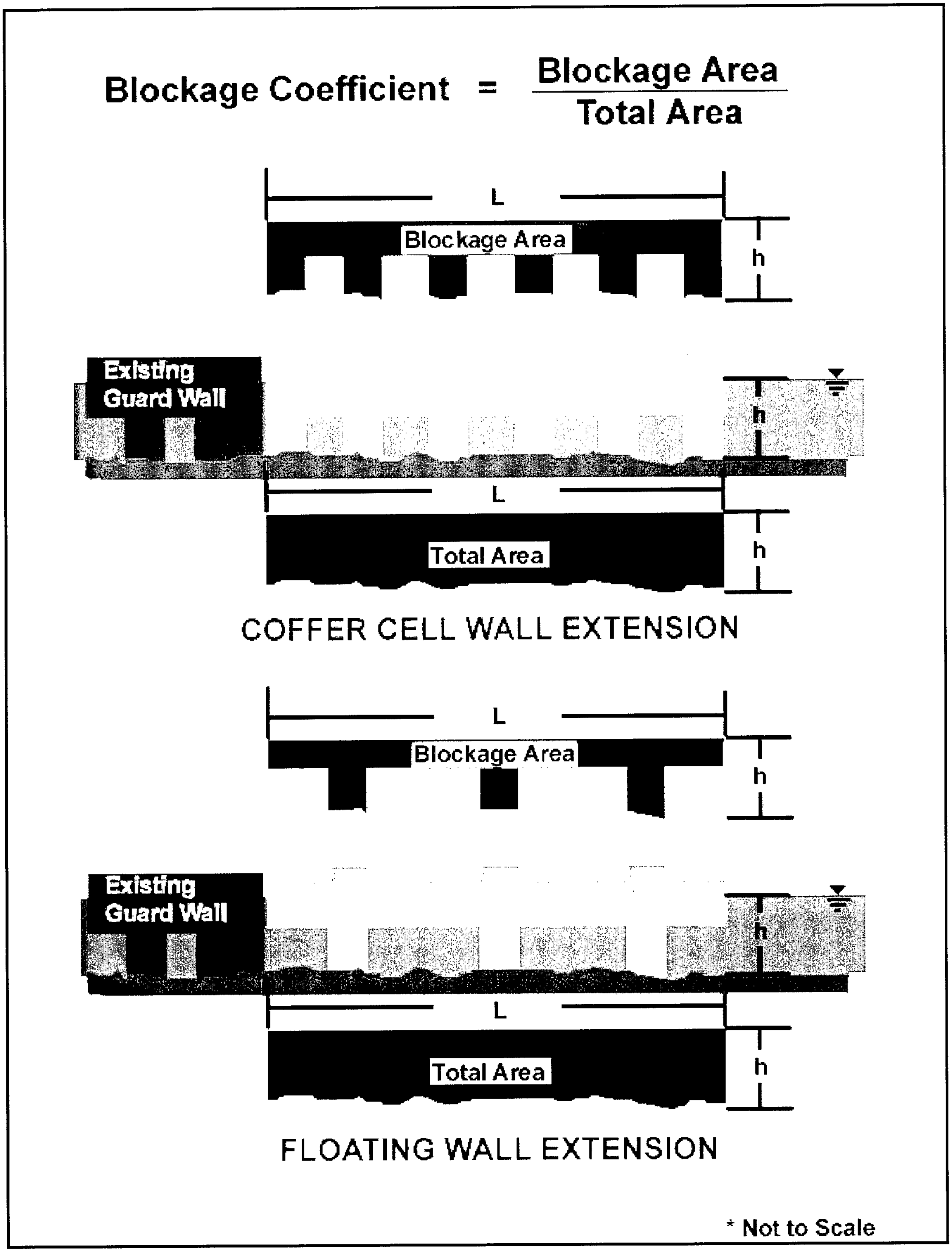


Figure 43. Blockage coefficient diagram

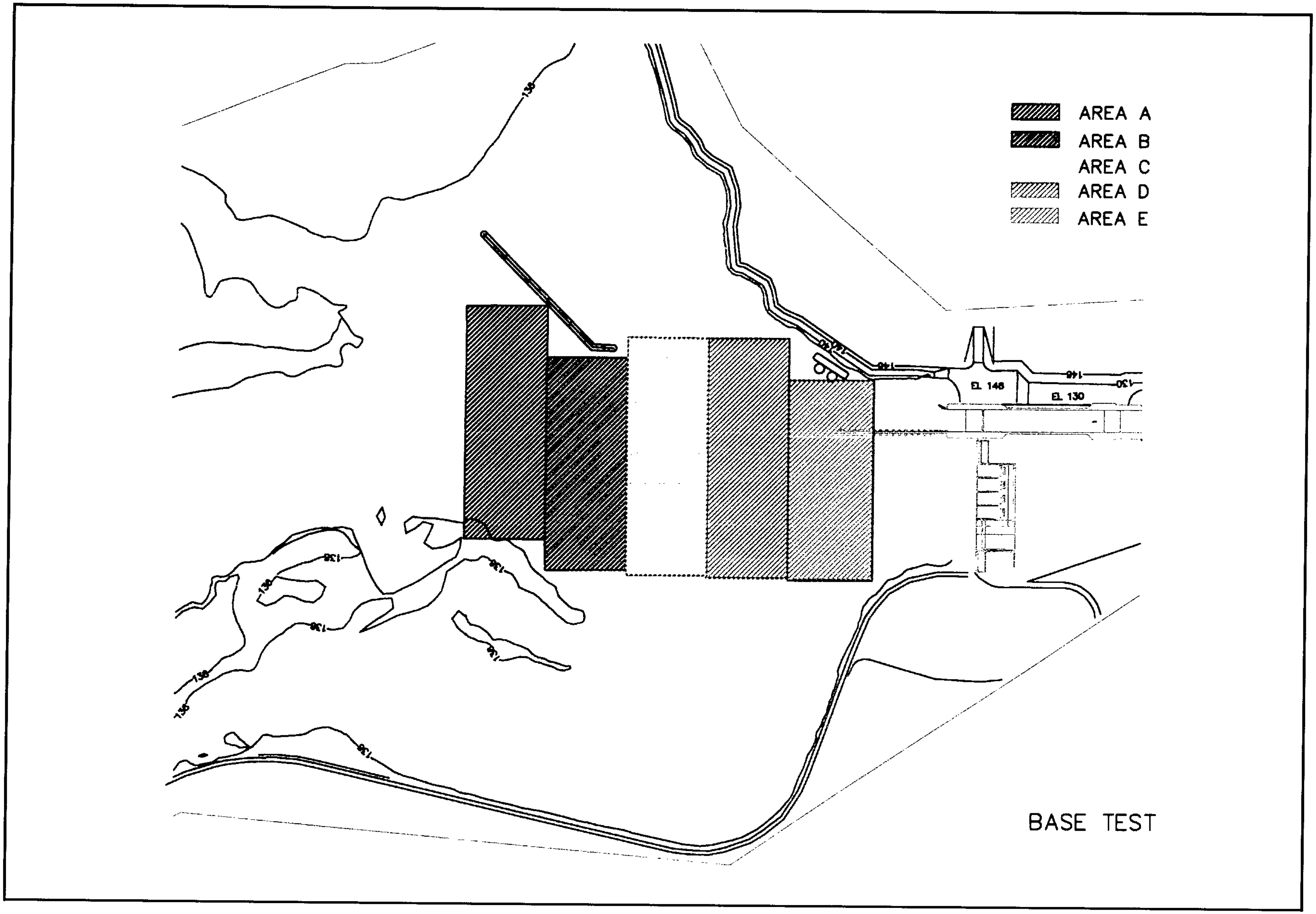


Figure 44. Ranges

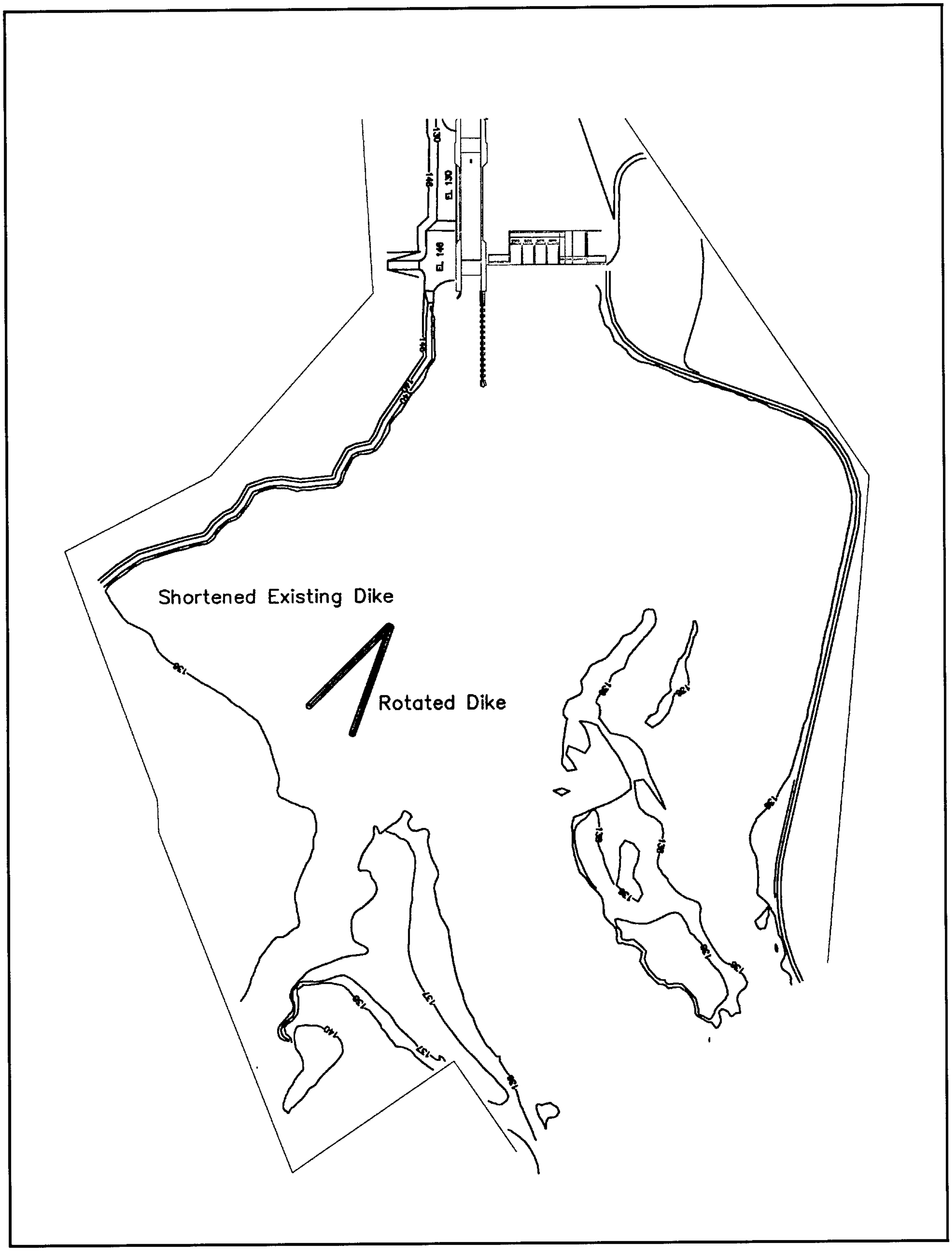
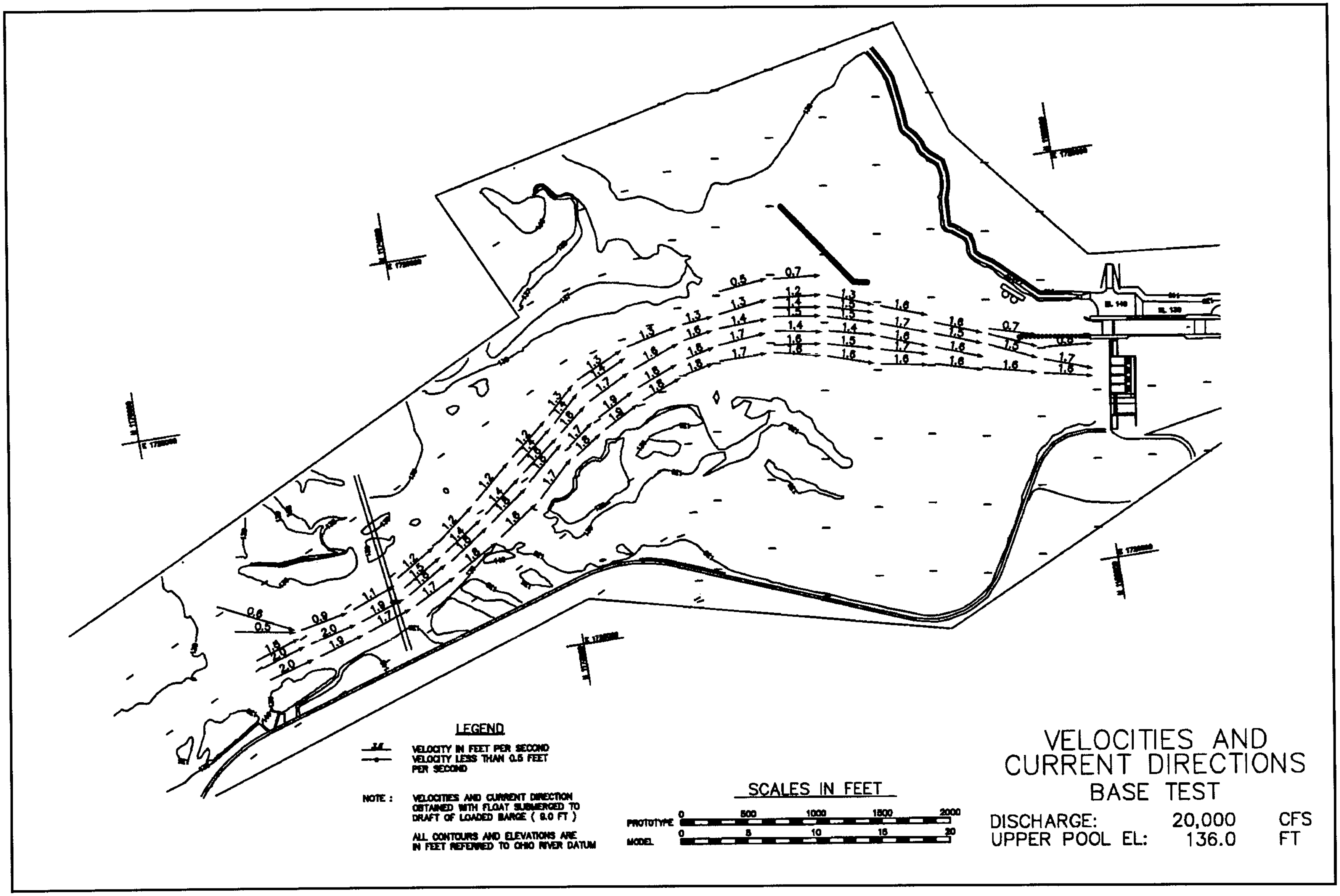


Figure 45. Rotated dike addition


VELOCITIES AND
CURRENT DIRECTIONS
BASE TEST
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE: VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20

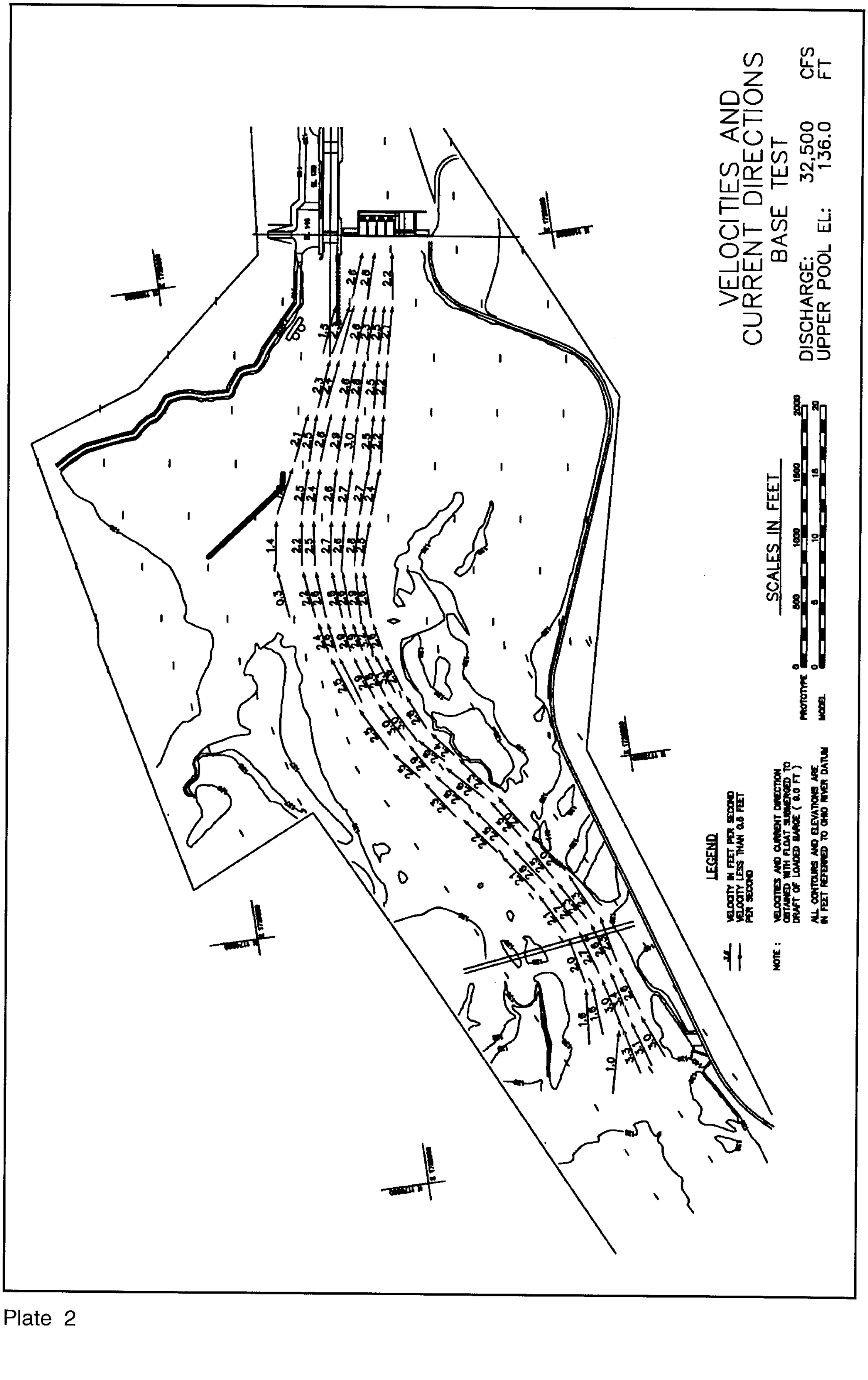
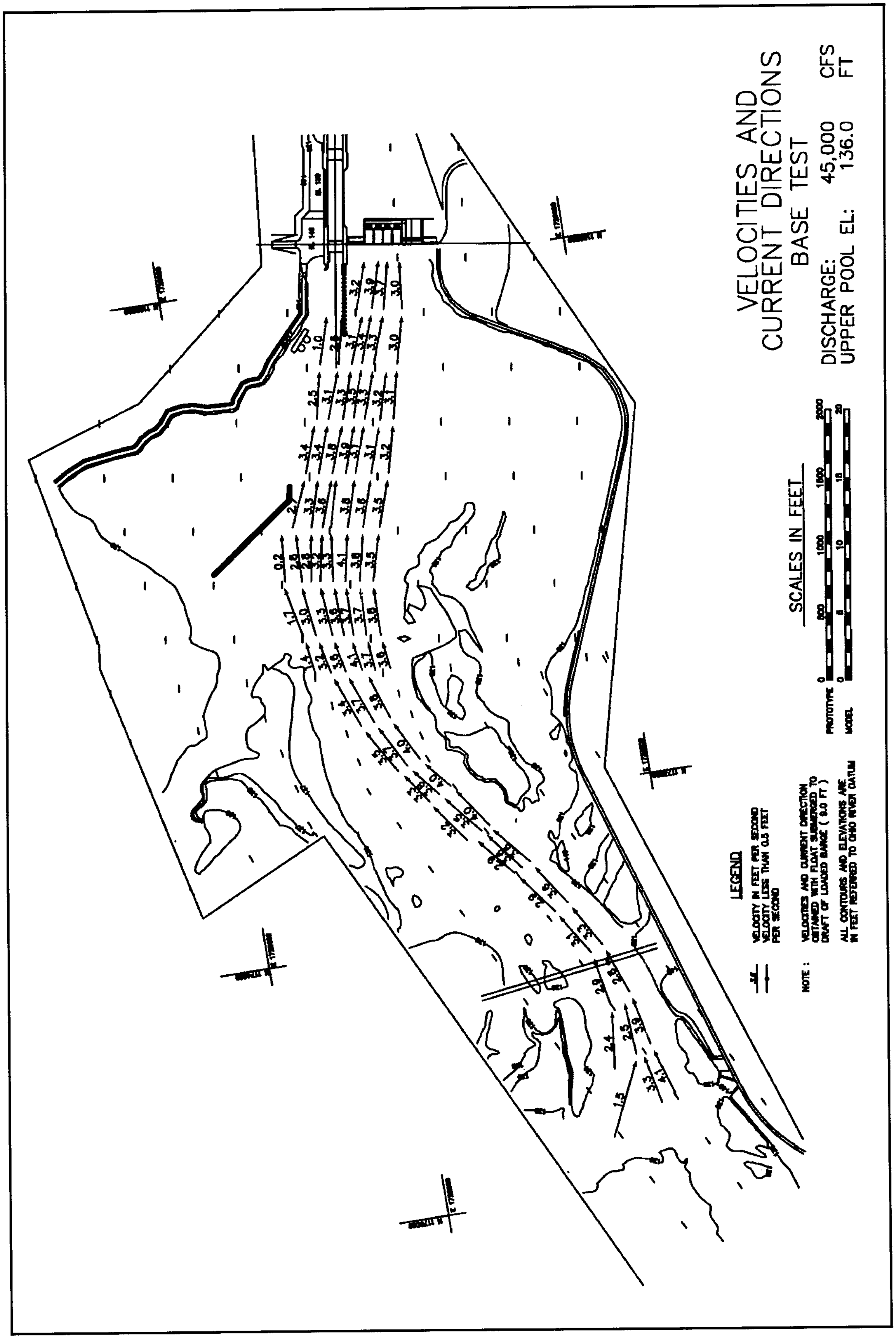
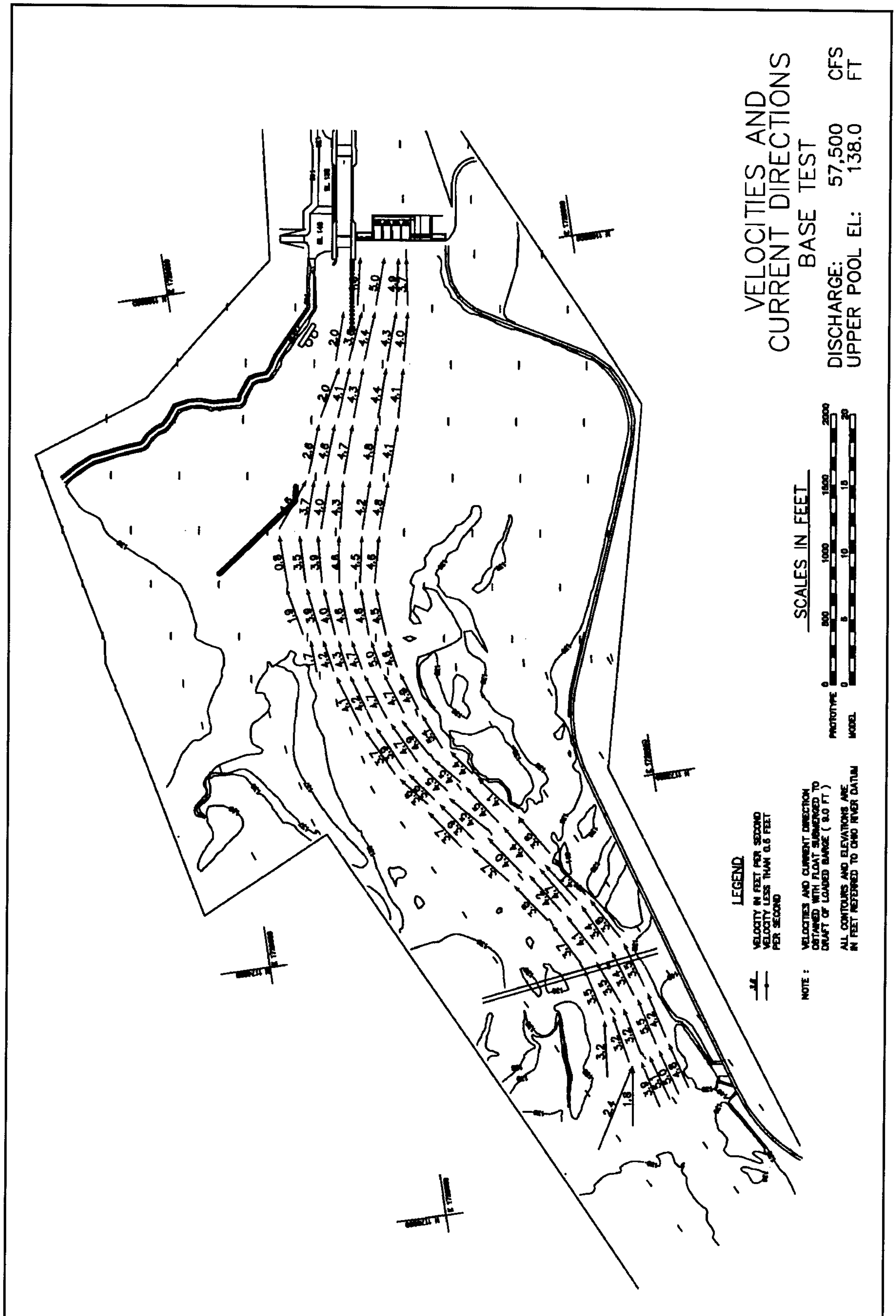
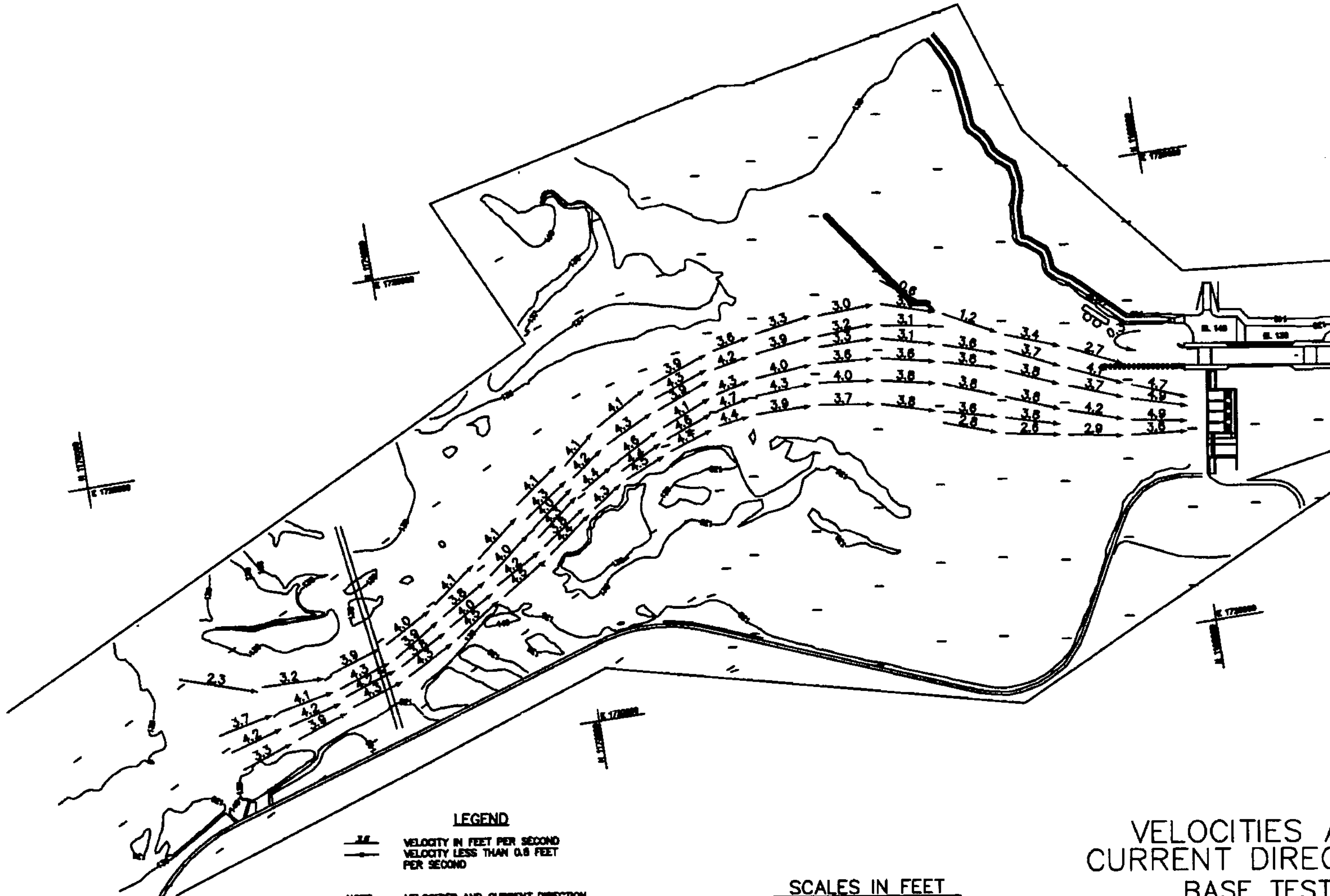

VELOCITIES AND
CURRENT DIRECTIONS
BASE TEST
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE: VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

Plate 2


VELOCITIES AND
CURRENT DIRECTIONS
BASE TEST
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


VELOCITIES AND
CURRENT DIRECTIONS
BASE TEST
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE: VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



LEGEND

VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.8 FEET PER SECOND

NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)

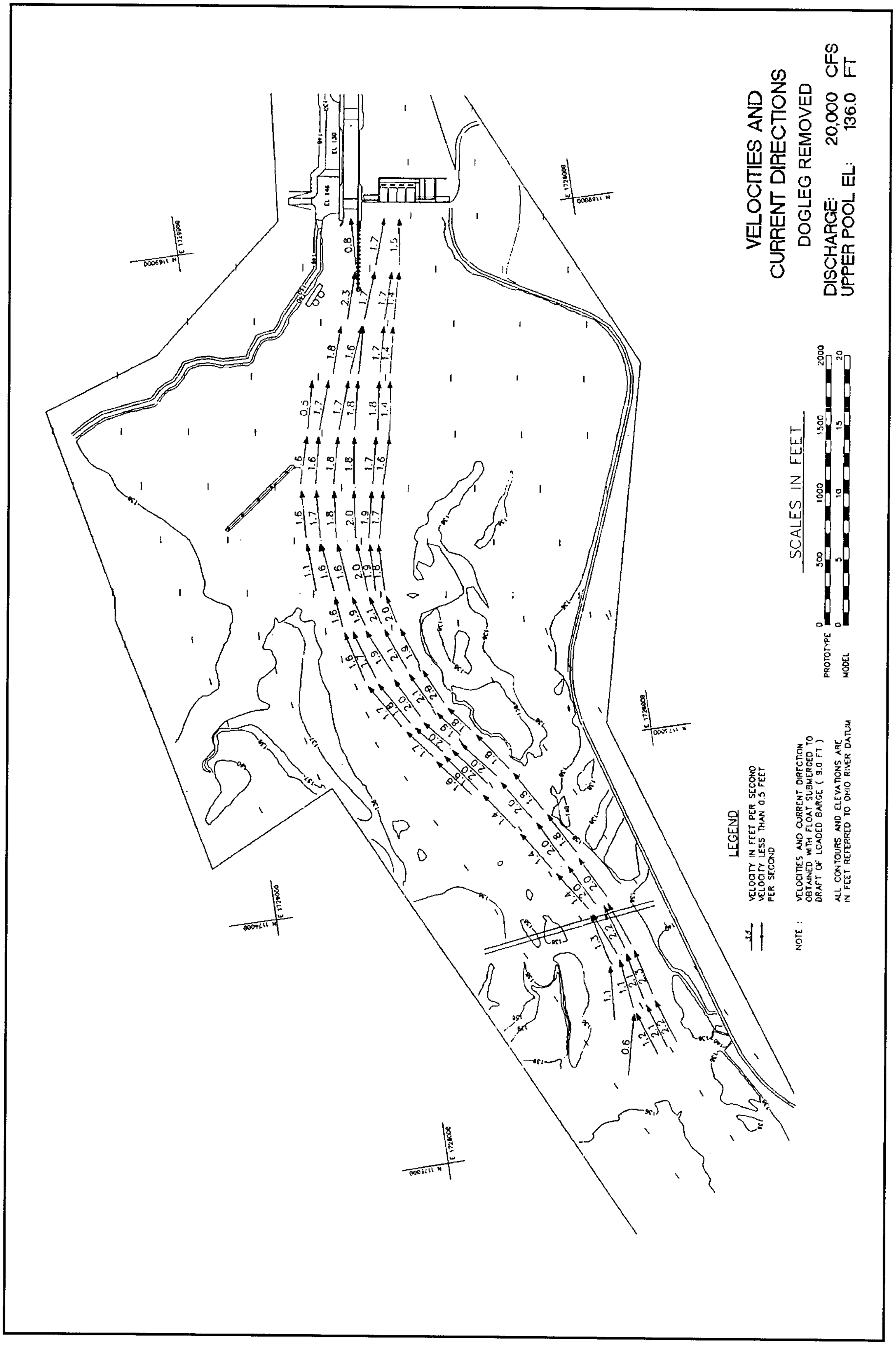
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

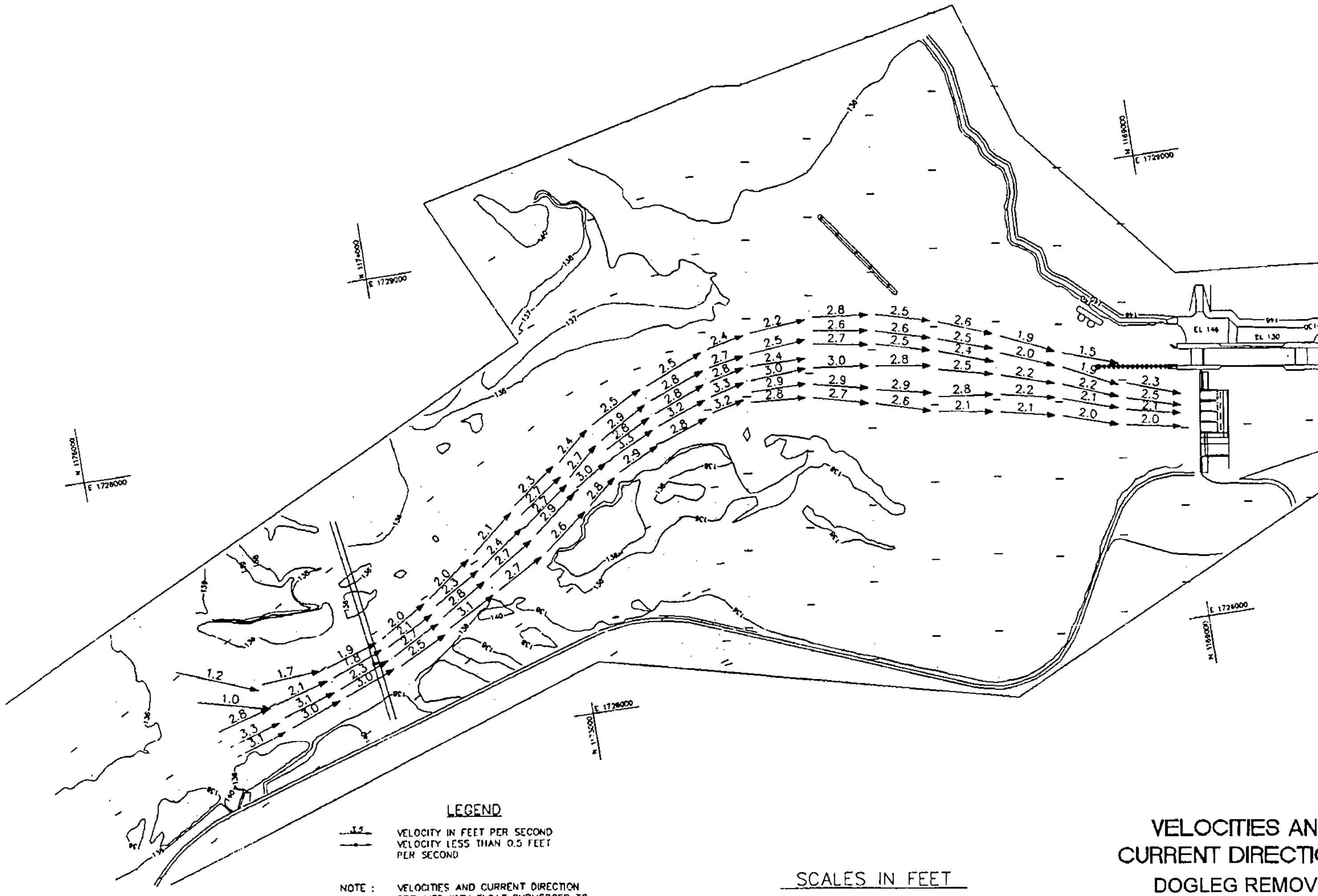
SCALES IN FEET

PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20

VELOCITIES AND
CURRENT DIRECTIONS
BASE TEST

DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT


VELOCITIES AND CURRENT DIRECTIONS
DOGLEG REMOVED
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



LEGEND

3.5 VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND

NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20

VELOCITIES AND
CURRENT DIRECTIONS
DOGLEG REMOVED

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT

Plate 7

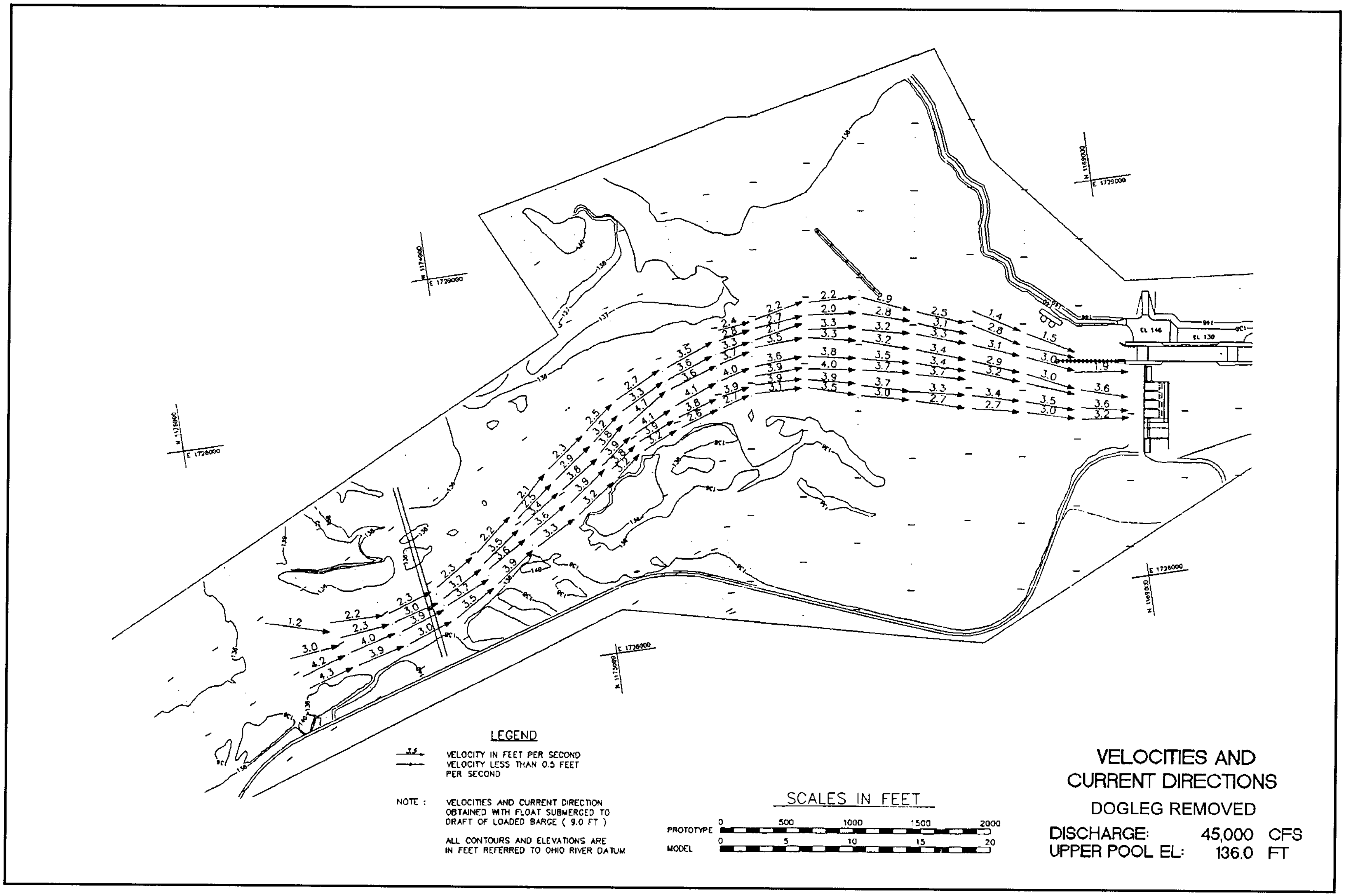
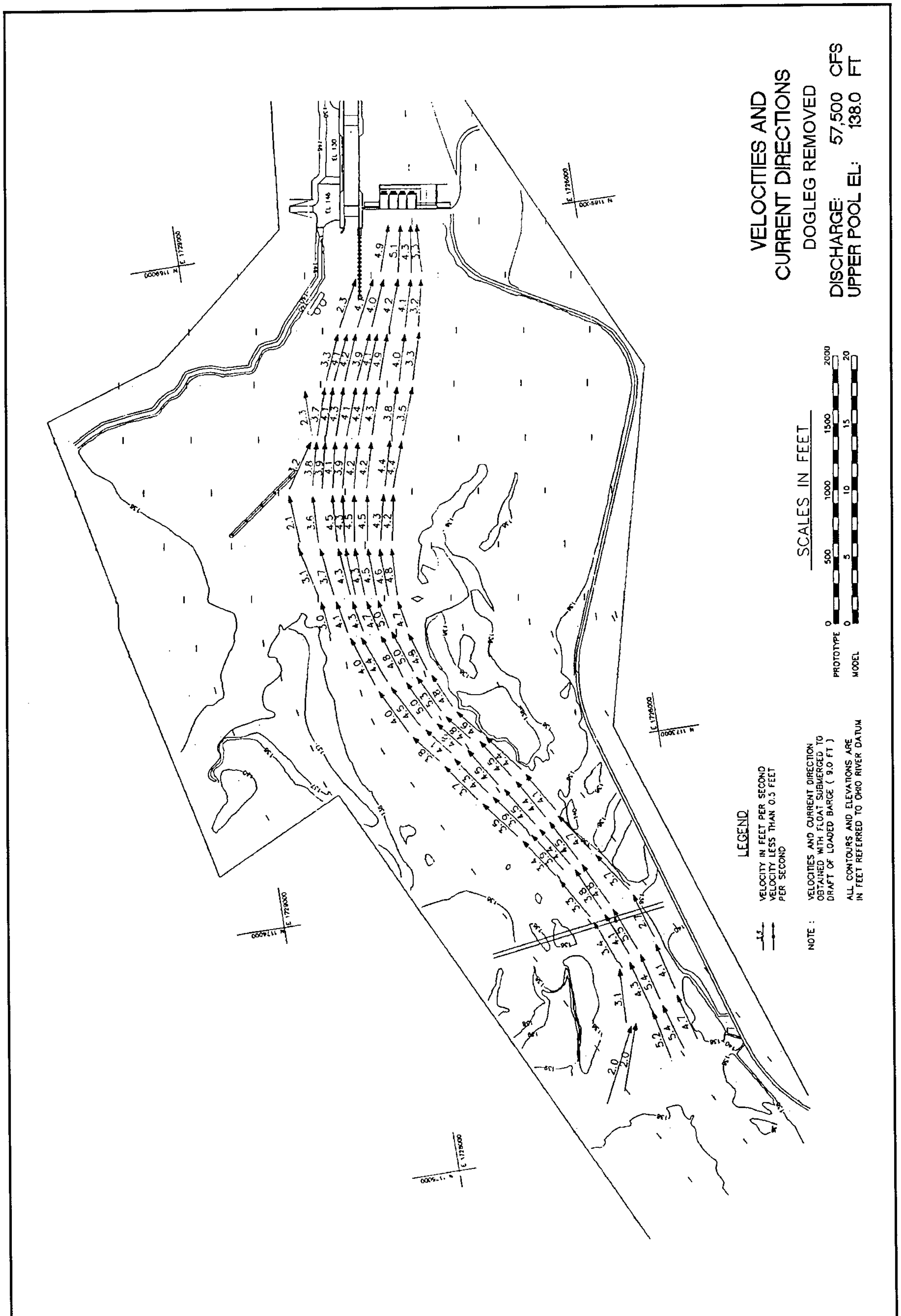
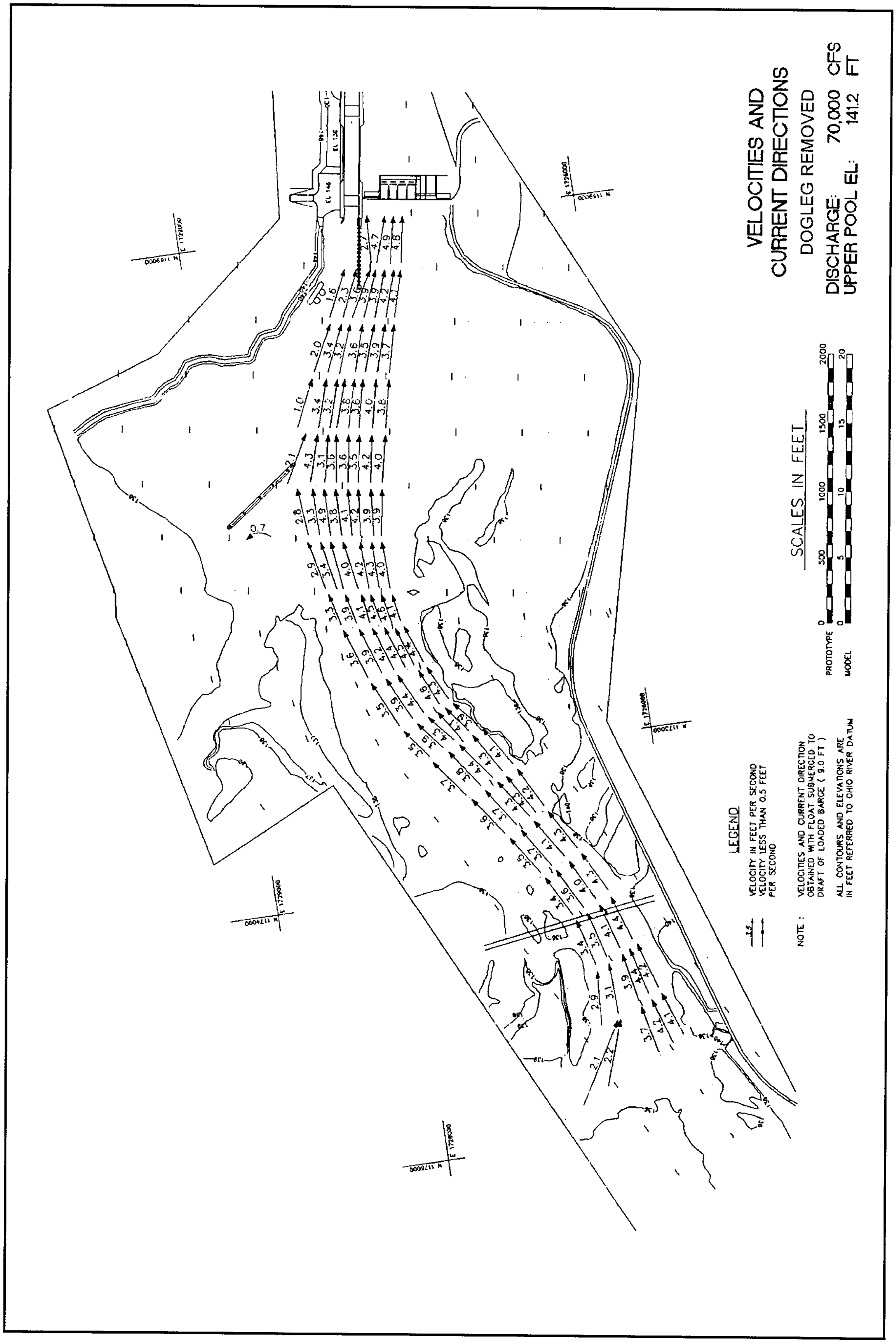
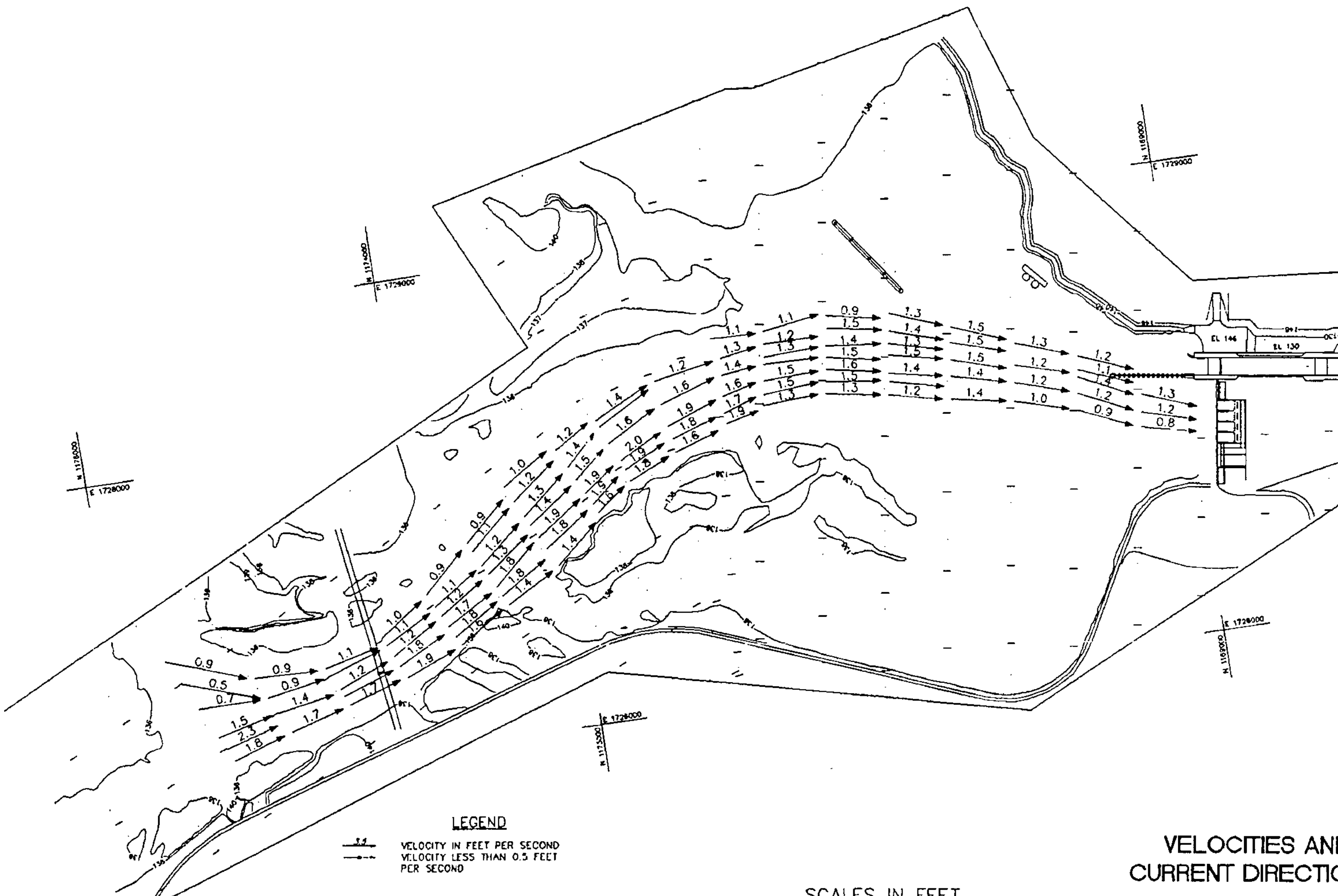

LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
VELOCITIES AND
CURRENT DIRECTIONS
DOGLEG REMOVED
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
EL 146
EL 130

Plate 8


VELOCITIES AND
CURRENT DIRECTIONS
DOGLEG REMOVED
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE: VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


VELOCITIES AND CURRENT DIRECTIONS
DOGLEG REMOVED
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
3.5 VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE: VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



LEGEND

VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND

NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20

VELOCITIES AND CURRENT DIRECTIONS

MUSEUM MOVED

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT

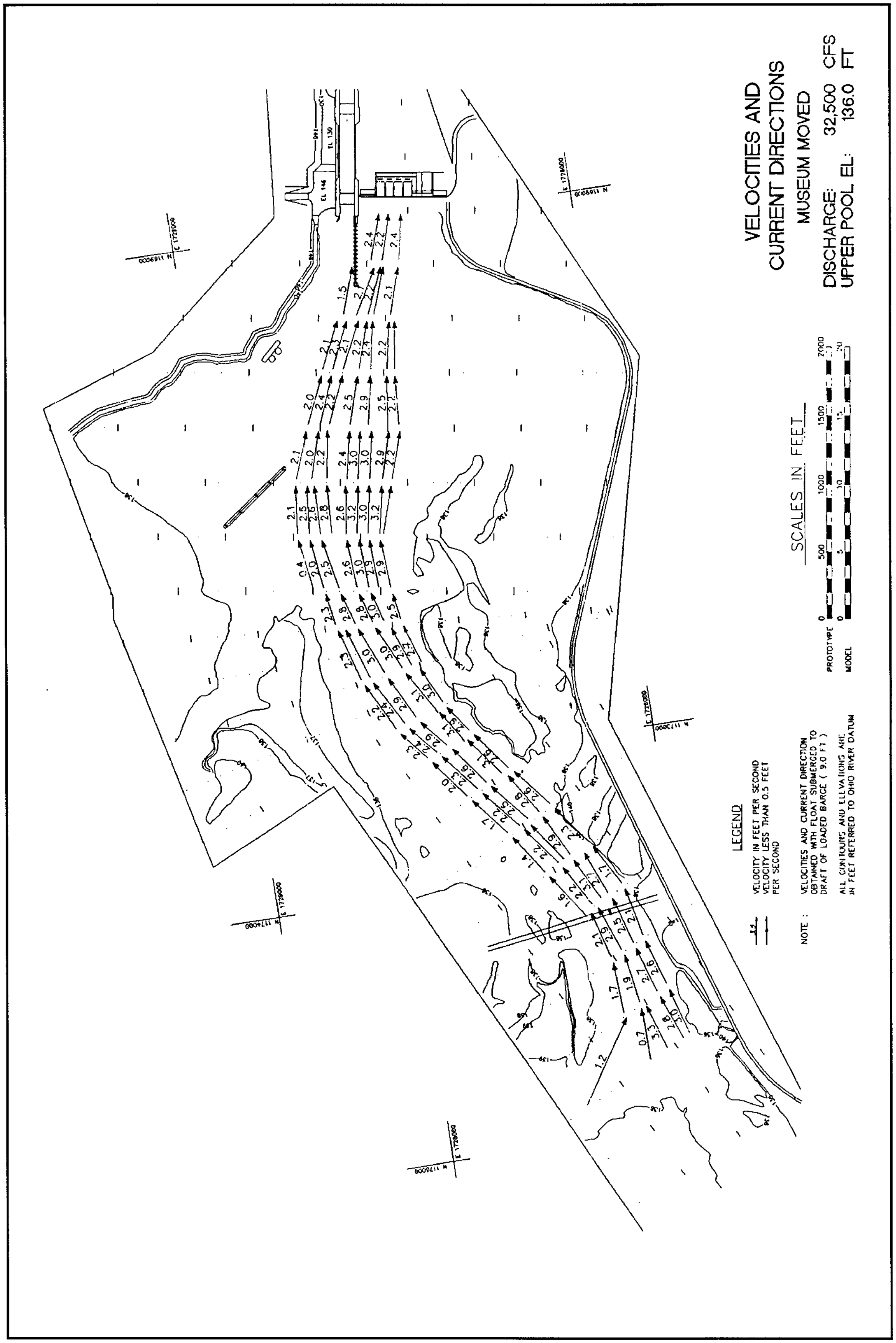
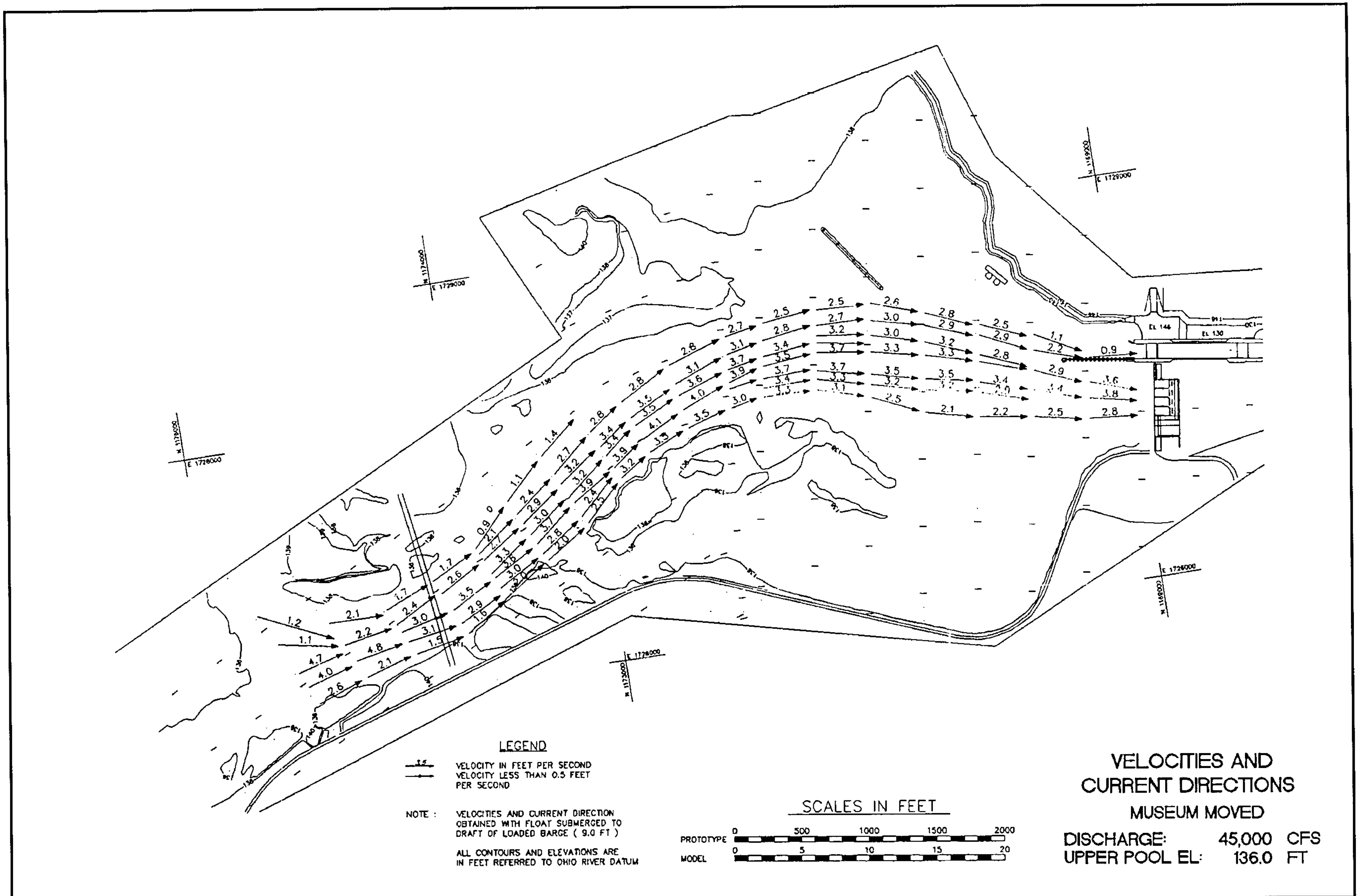

VELOCITIES AND
CURRENT DIRECTIONS
MUSEUM MOVED
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE: VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

Plate 12


LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
VELOCITIES AND CURRENT DIRECTIONS
MUSEUM MOVED
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT

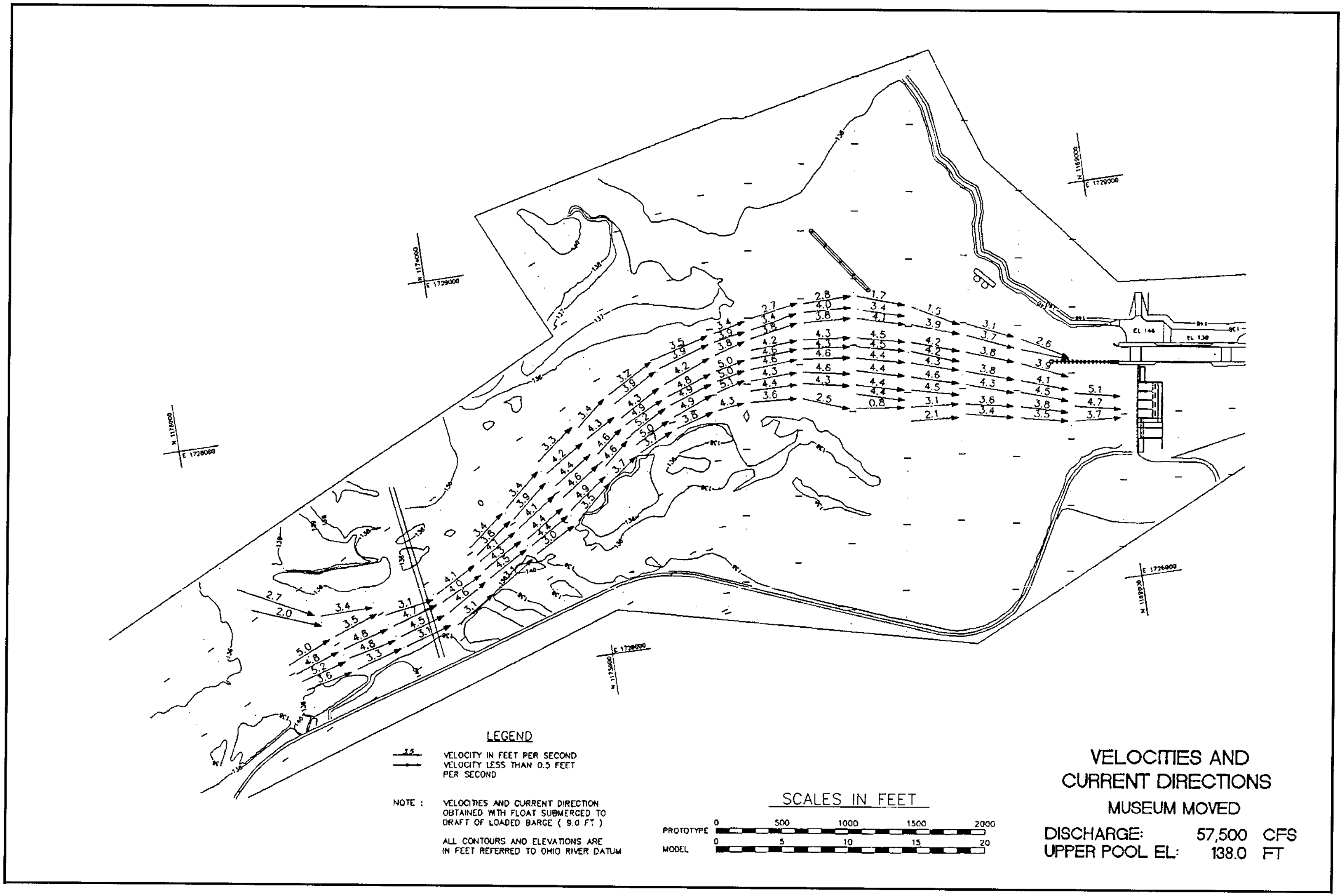
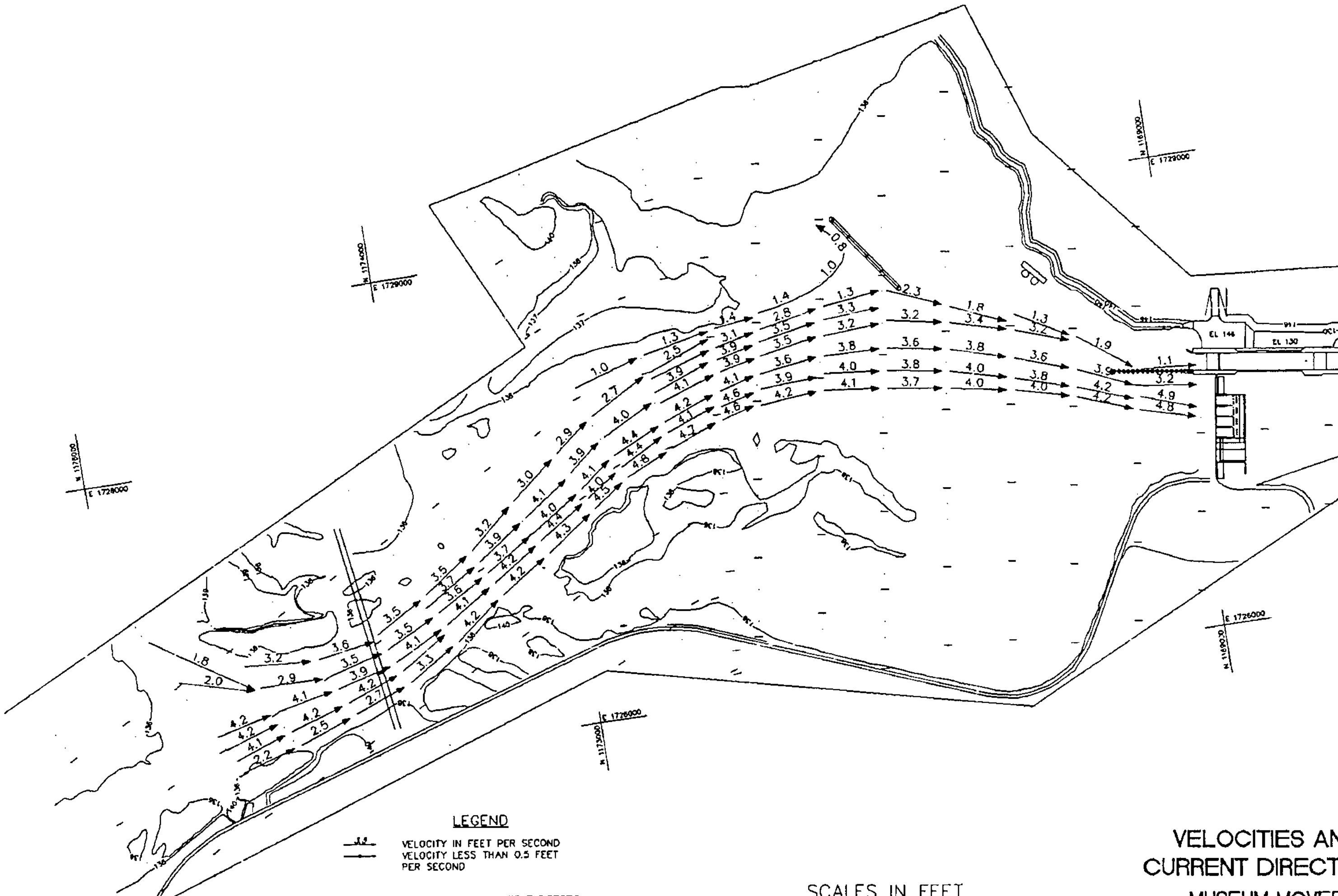

VELOCITIES AND
CURRENT DIRECTIONS
MUSEUM MOVED
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 144
EL 138

Plate 14



LEGEND

—3.2→ VELOCITY IN FEET PER SECOND
——→ VELOCITY LESS THAN 0.5 FEET PER SECOND

NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

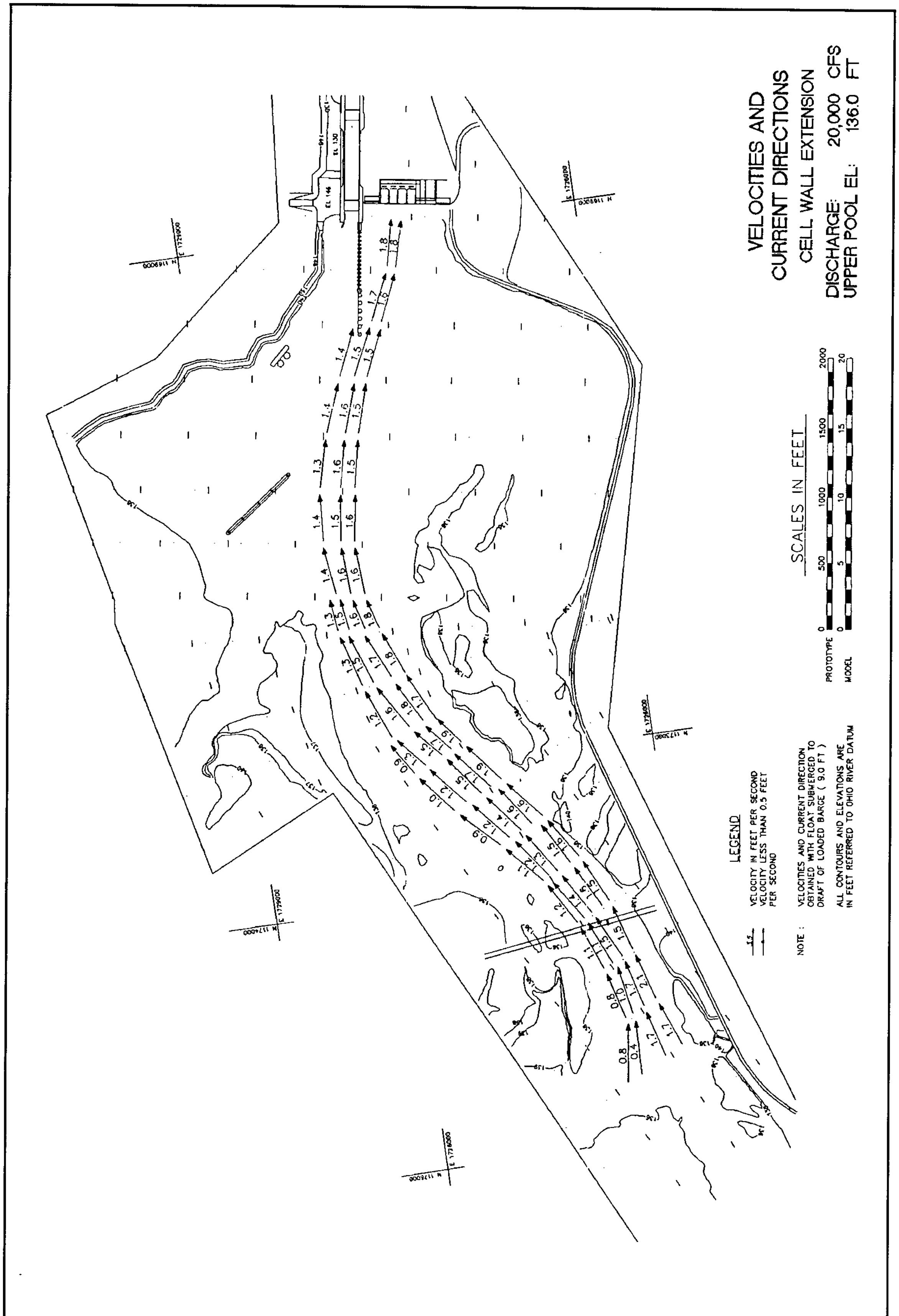
MODEL 0 5 10 15 20

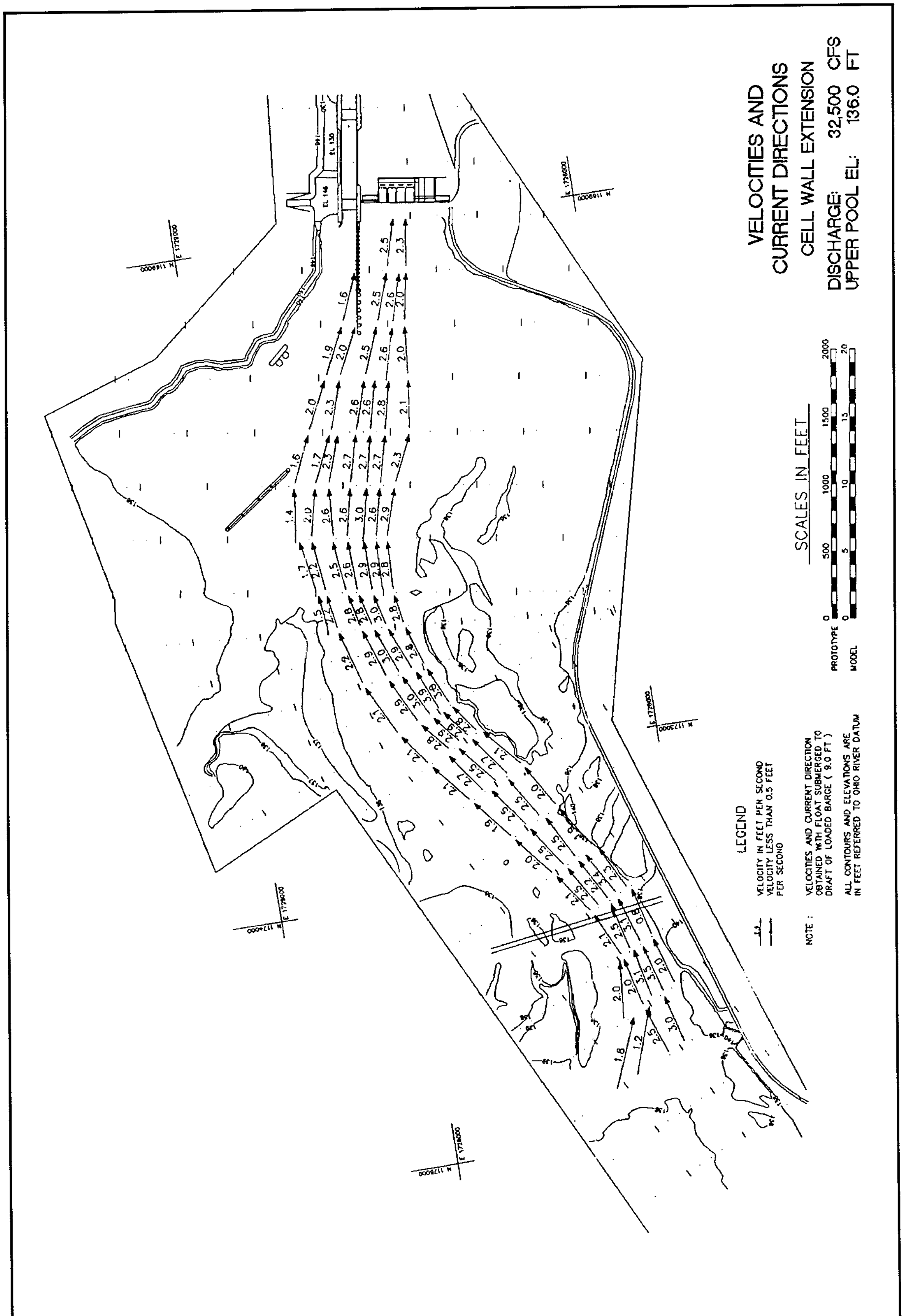
VELOCITIES AND CURRENT DIRECTIONS

MUSEUM MOVED

DISCHARGE: 70,000 CFS

UPPER POOL EL: 141.2 FT


VELOCITIES AND CURRENT DIRECTIONS
CELL WALL EXTENSION
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE: VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


VELOCITIES AND CURRENT DIRECTIONS
CELL WALL EXTENSION
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE: VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

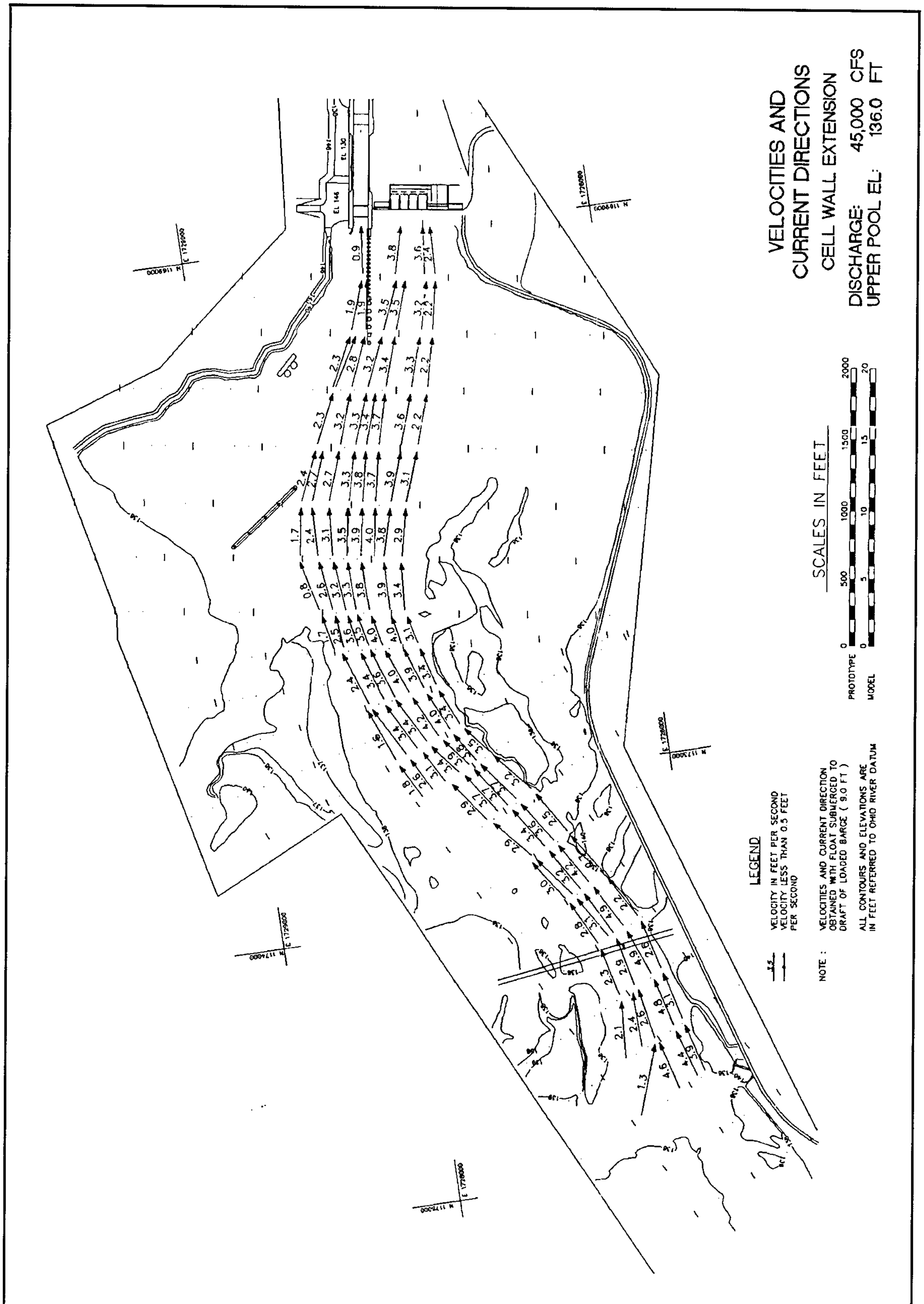
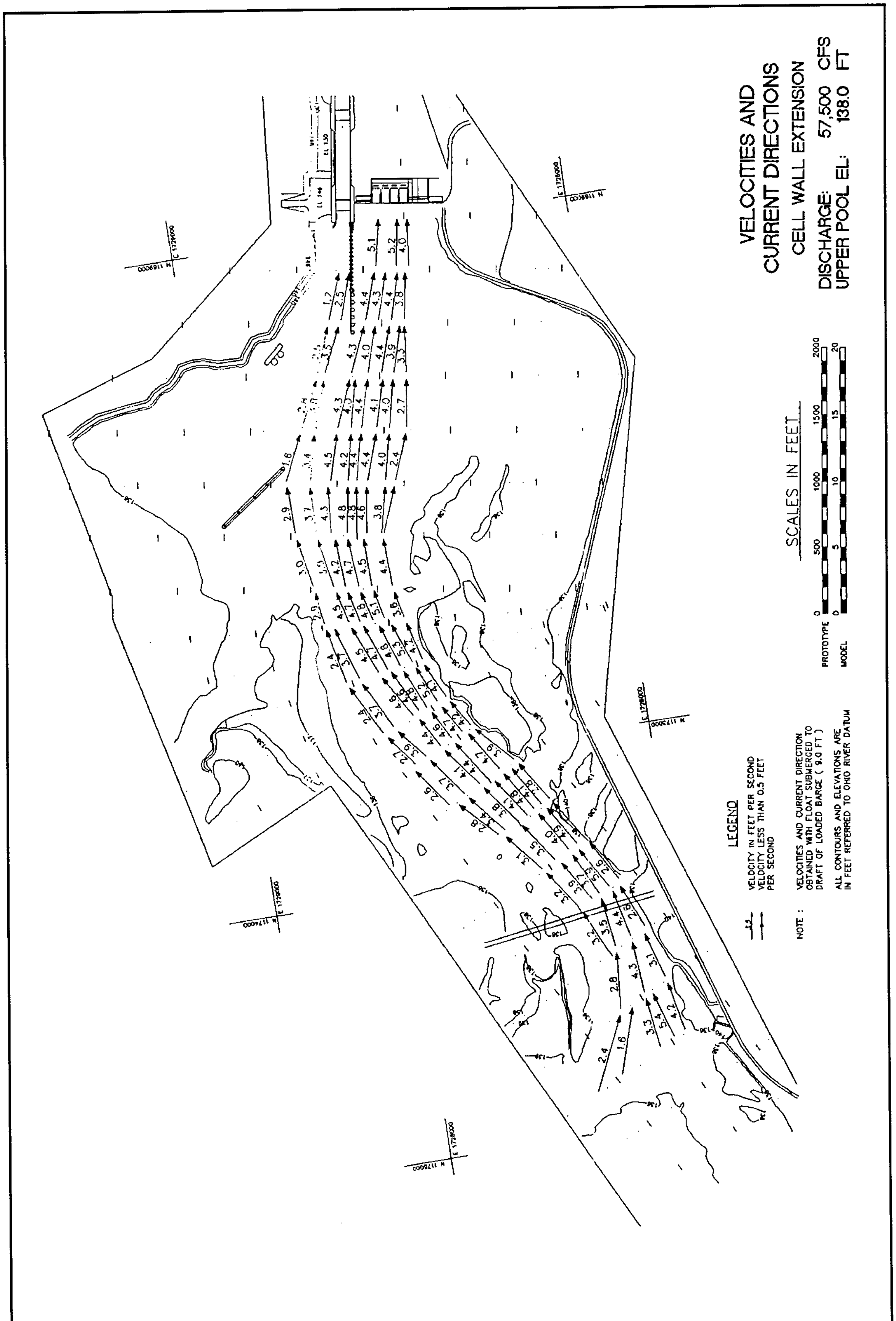
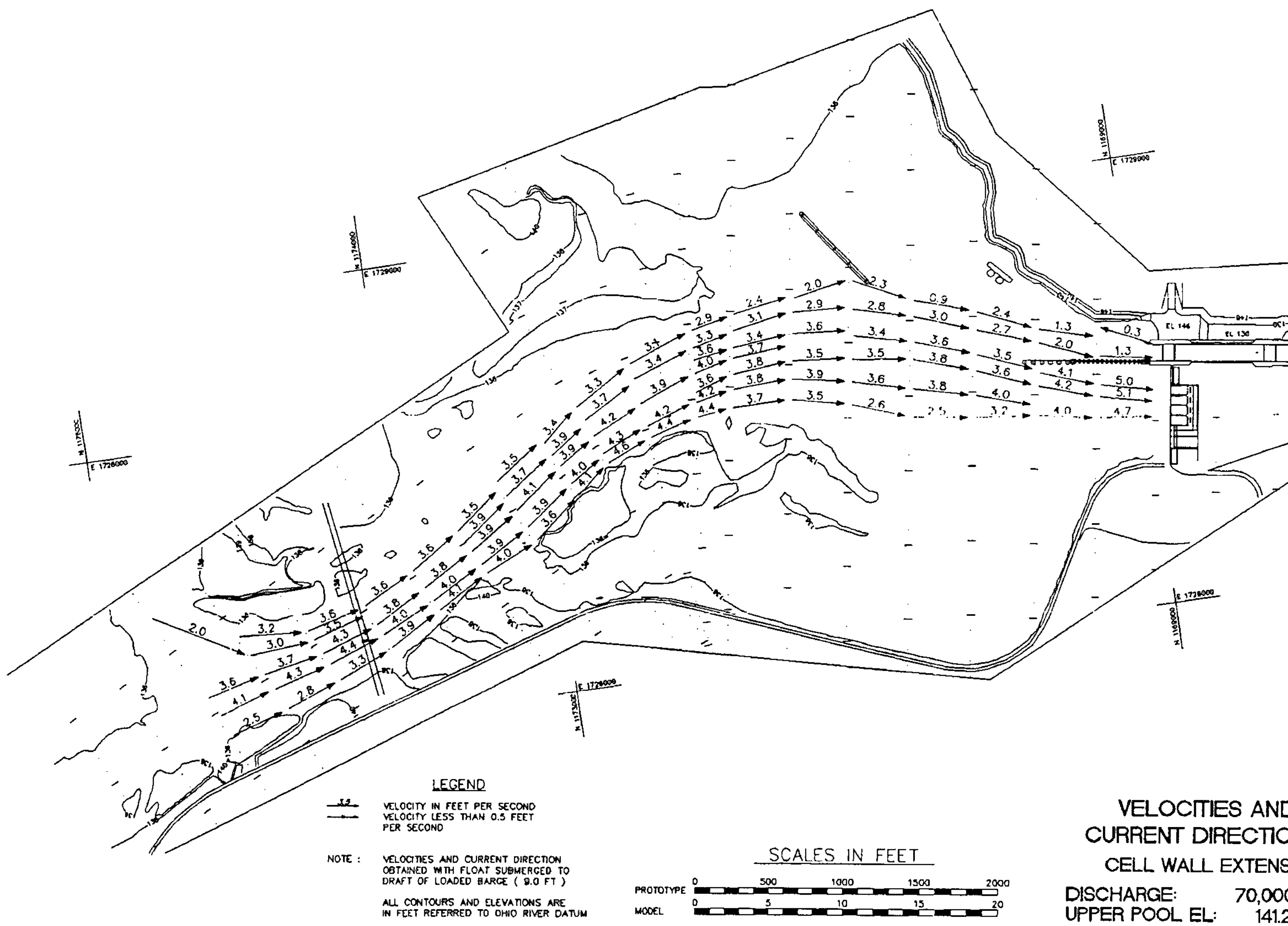

VELOCITIES AND
CURRENT DIRECTIONS
CELL WALL EXTENSION
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE
MODEL
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

Plate 18


VELOCITIES AND CURRENT DIRECTIONS
CELL WALL EXTENSION
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE
MODEL
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

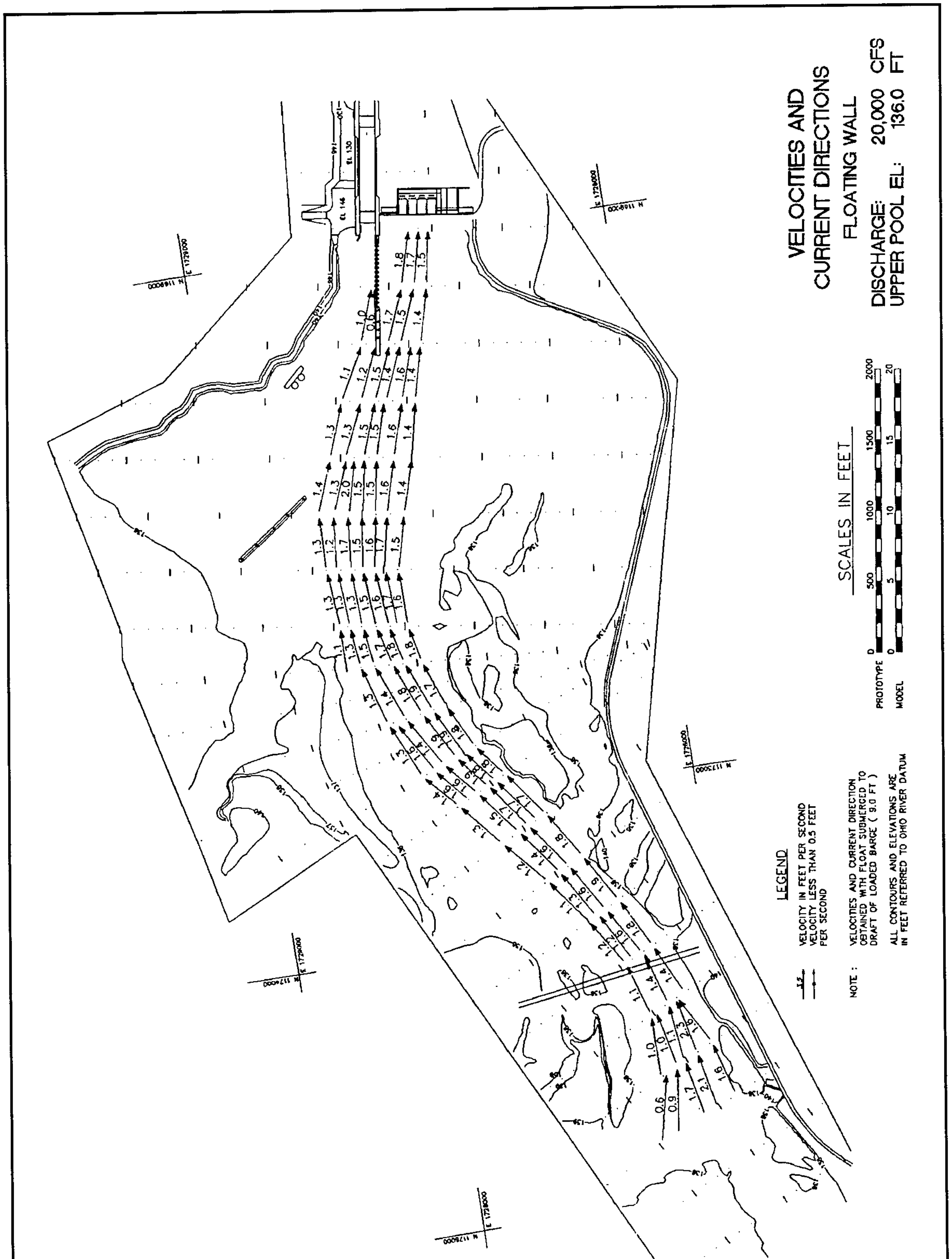


VELOCITIES AND CURRENT DIRECTIONS

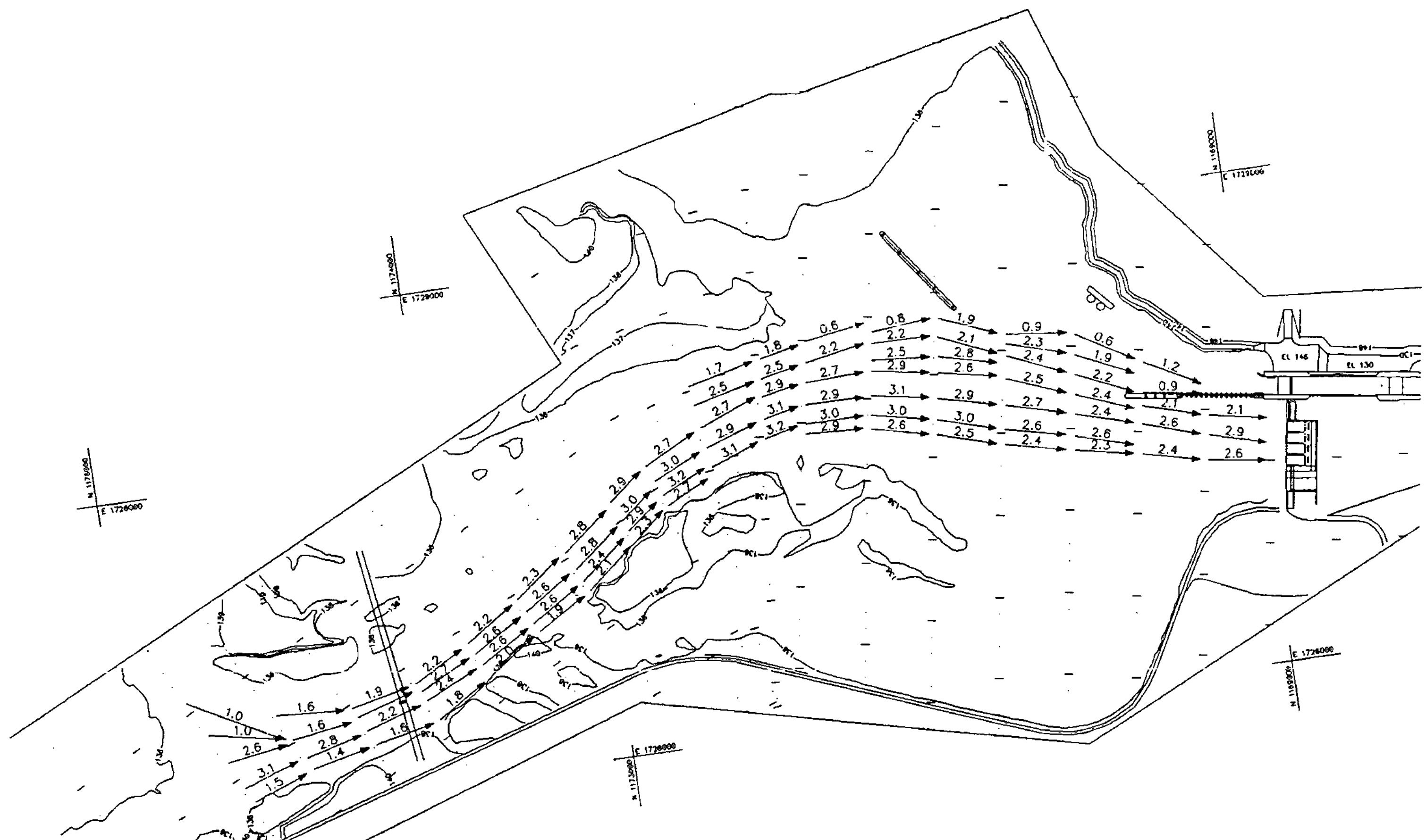
CELL WALL EXTENSION

DISCHARGE: 70,000 CFS

UPPER POOL EL: 141.2 FT



VELOCITIES AND CURRENT DIRECTIONS
FLOATING WALL
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



LEGEND

VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND

NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

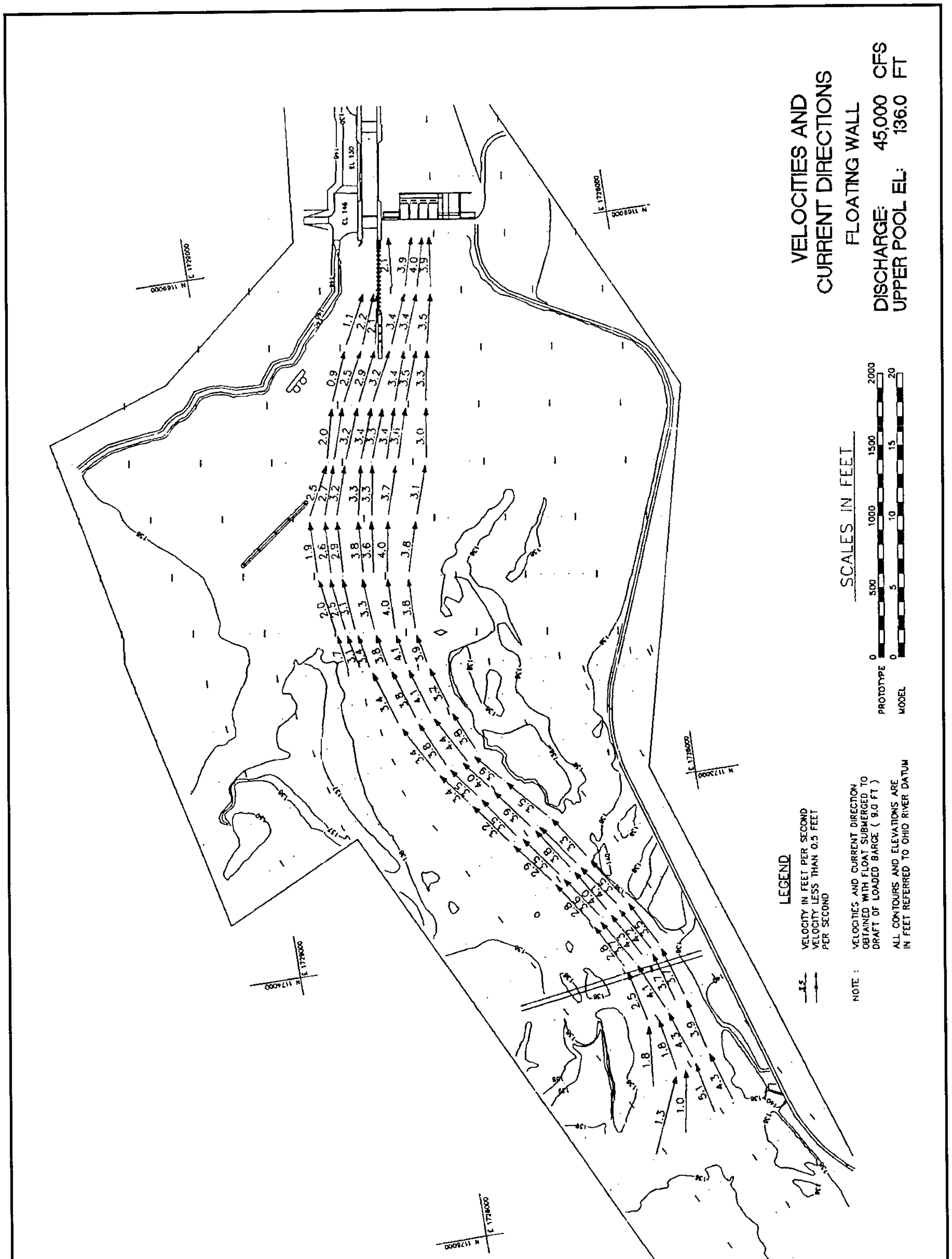
PROTOTYPE 0 500 1000 1500 2000

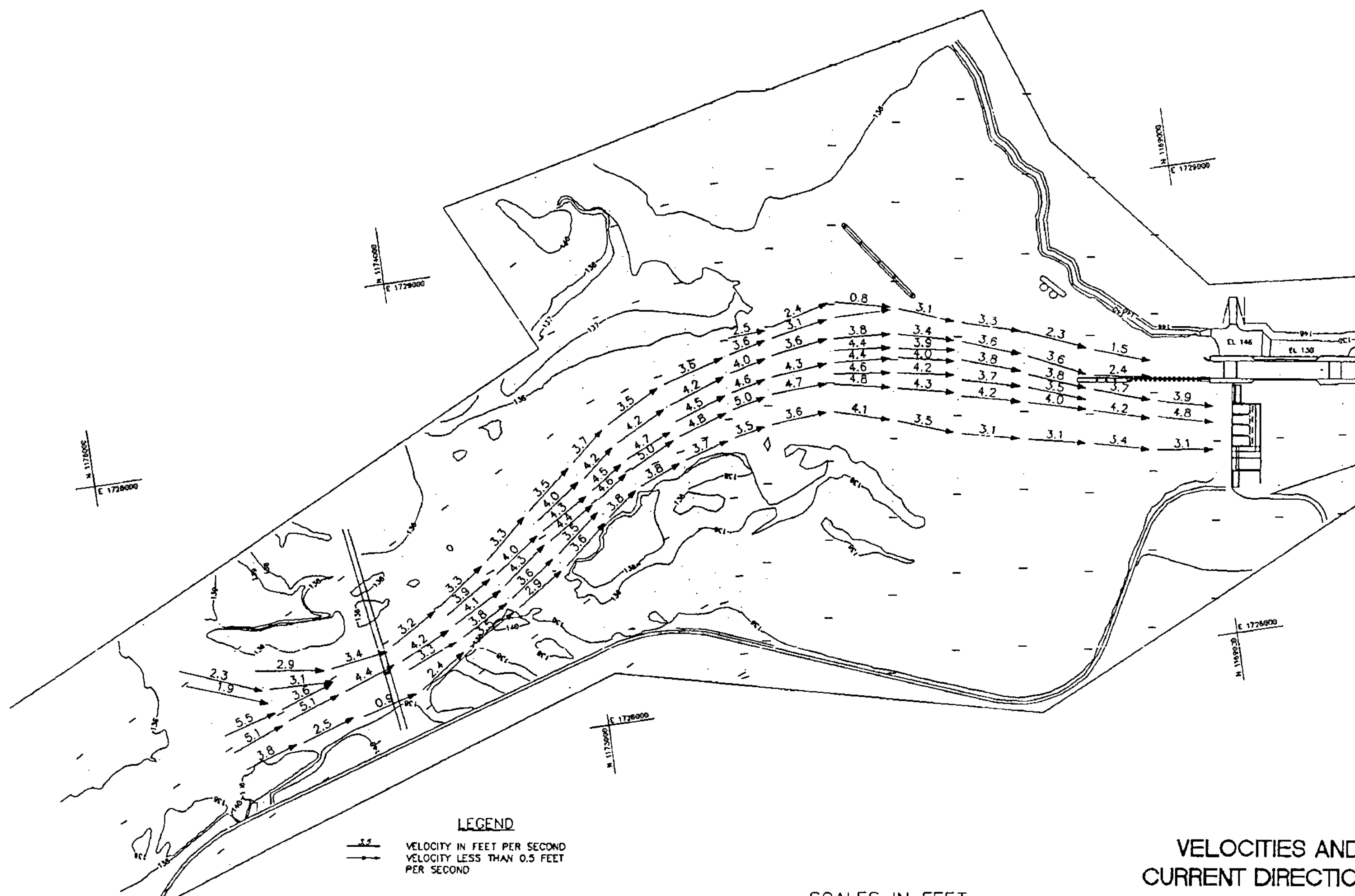
MODEL 0 5 10 15 20

VELOCITIES AND CURRENT DIRECTIONS

FLOATING WALL

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT


VELOCITIES AND
CURRENT DIRECTIONS
FLOATING WALL
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



LEGEND

VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND

NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

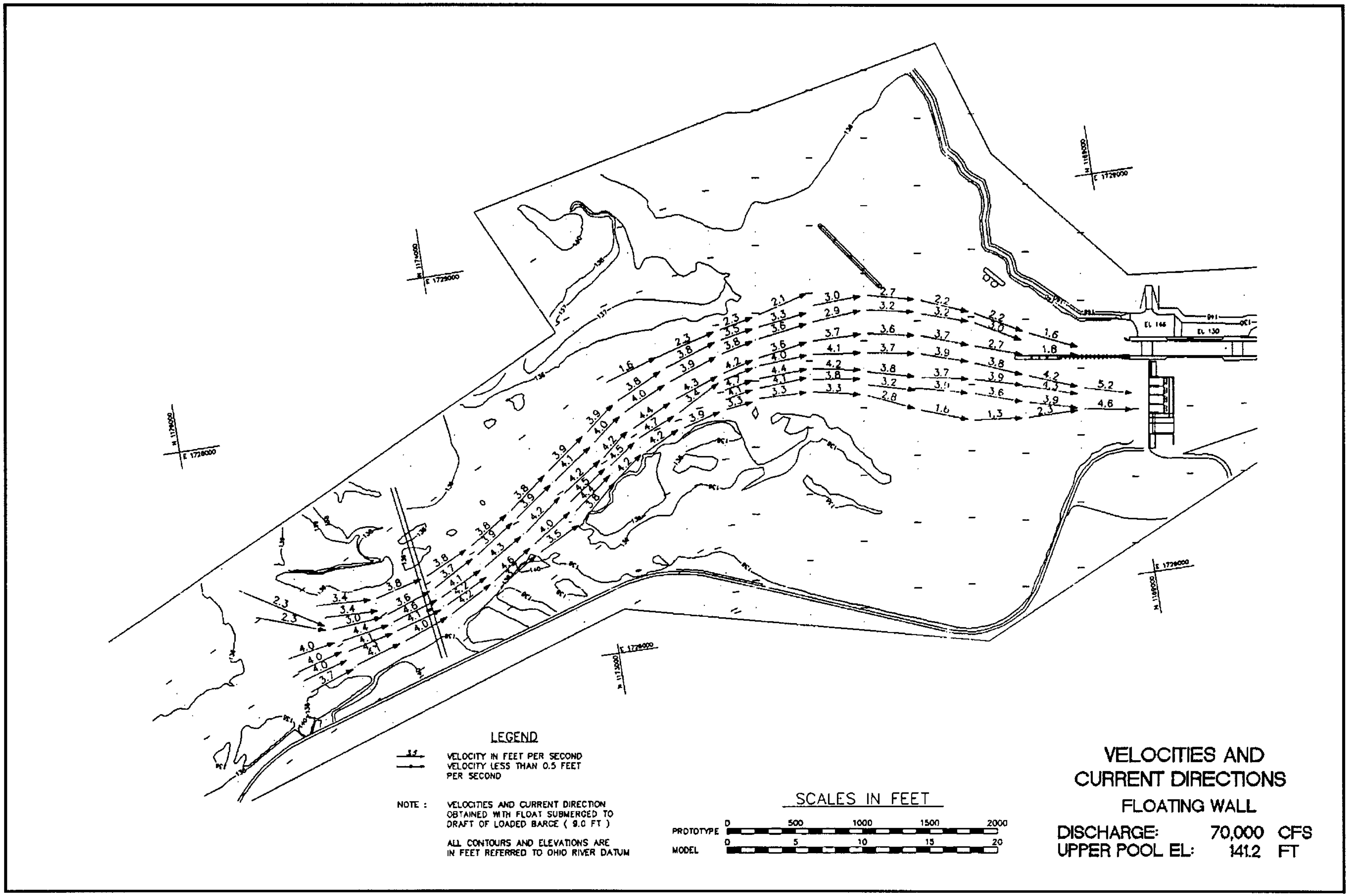
SCALES IN FEET

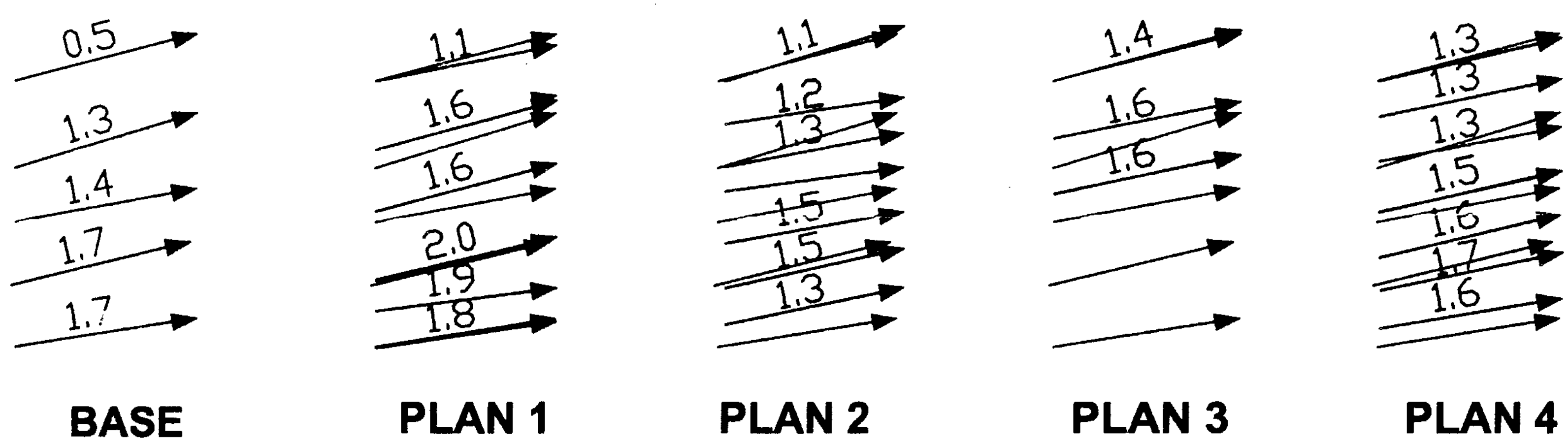
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20

VELOCITIES AND CURRENT DIRECTIONS

FLOATING WALL

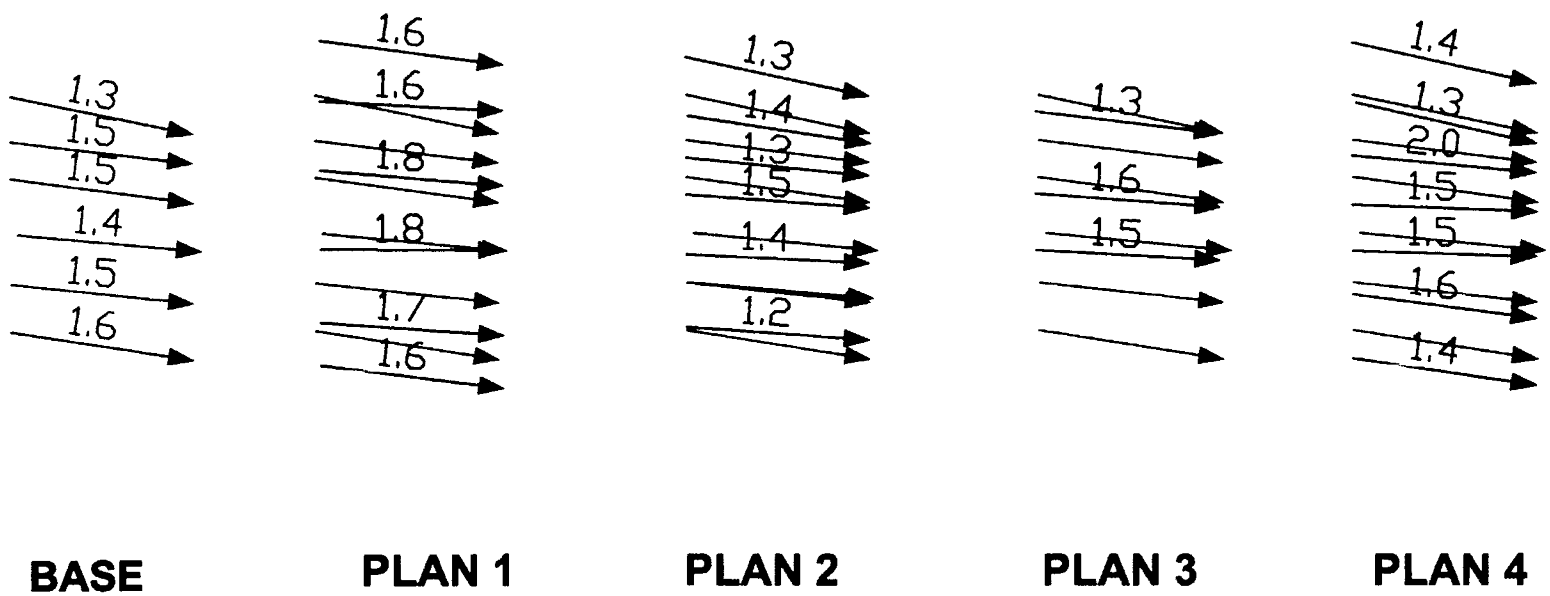
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT


VELOCITIES AND
CURRENT DIRECTIONS
FLOATING WALL
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
LEGEND
VELOCITY IN FEET PER SECOND
VELOCITY LESS THAN 0.5 FEET PER SECOND
NOTE : VELOCITIES AND CURRENT DIRECTION OBTAINED WITH FLOAT SUBMERGED TO DRAFT OF LOADED BARGE (9.0 FT)
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 146
EL 130



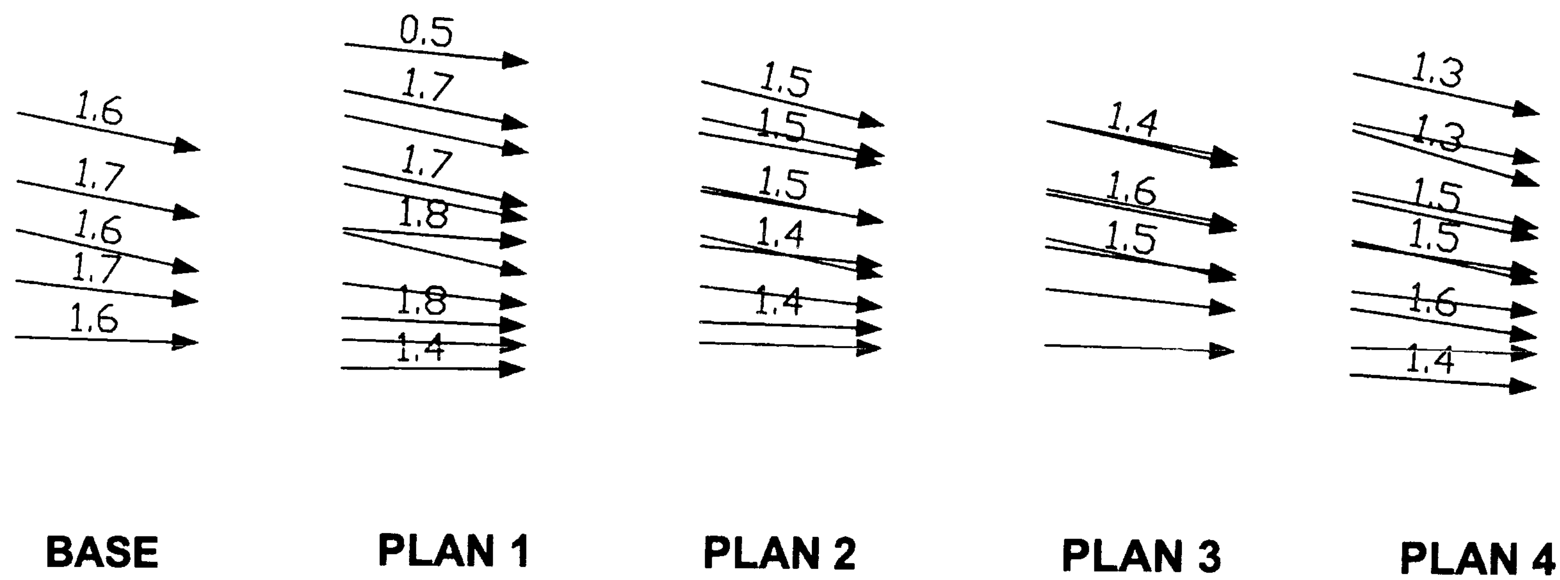
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE A
DISCHARGE - 20,000 CFS
UPPER POOL EL - 136.0 FT



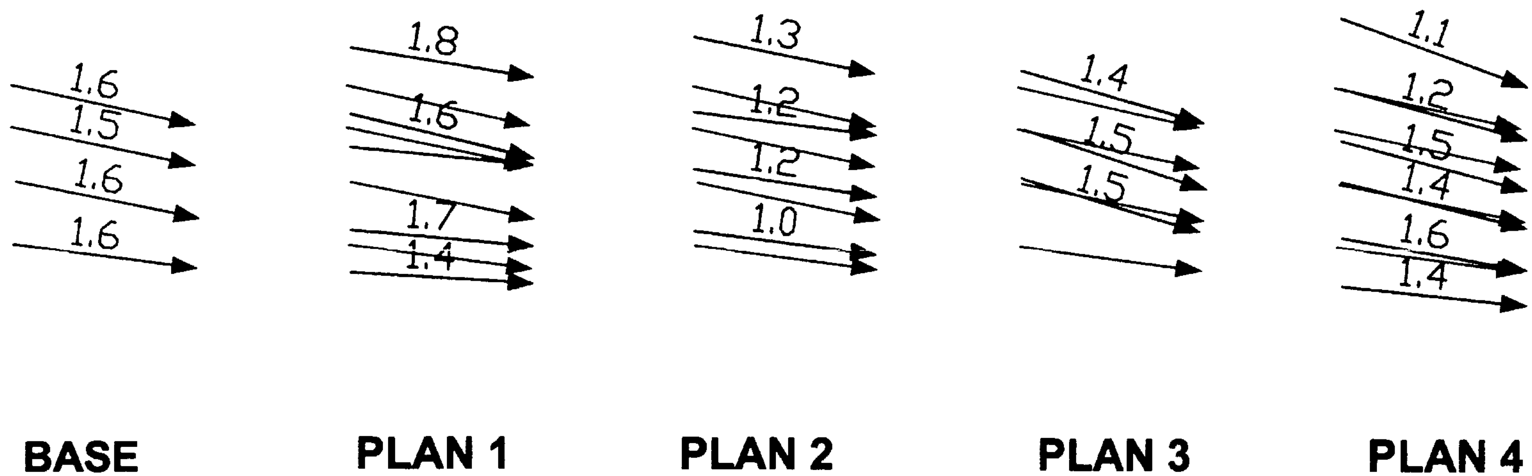
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE B
DISCHARGE - 20,000 CFS
UPPER POOL EL - 136.0 FT



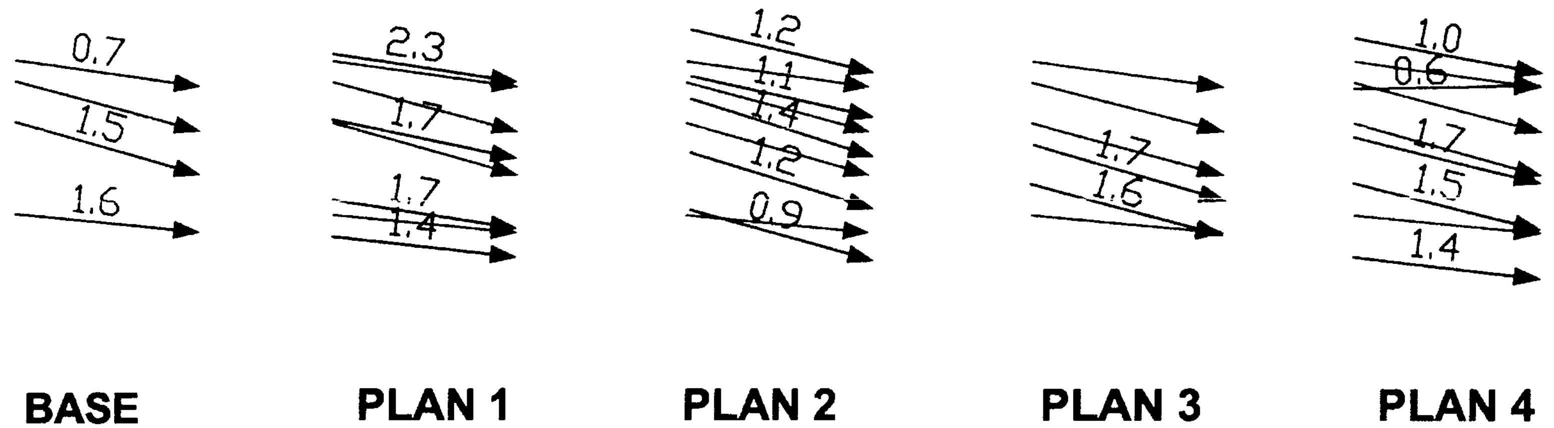
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE C
DISCHARGE - 20,000 CFS
UPPER POOL EL - 136.0 FT



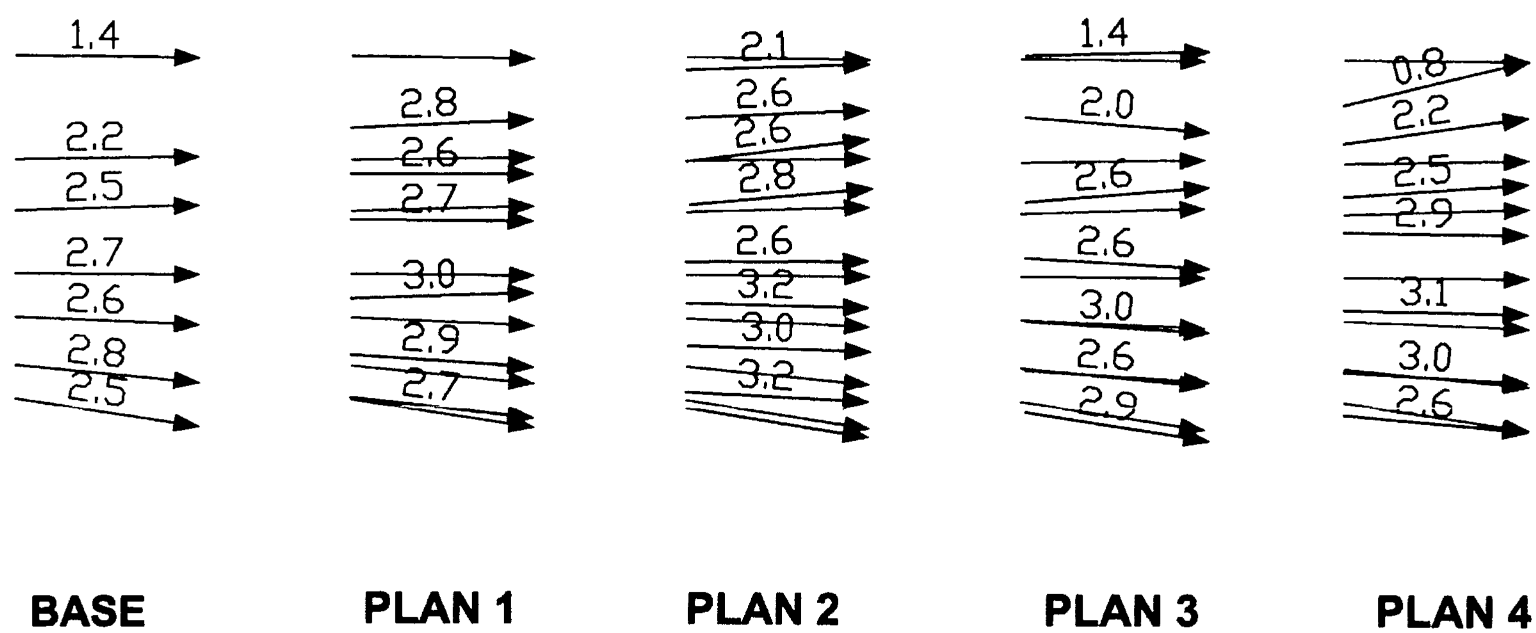
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE D
DISCHARGE - 20,000 CFS
UPPER POOL EL - 136.0 FT



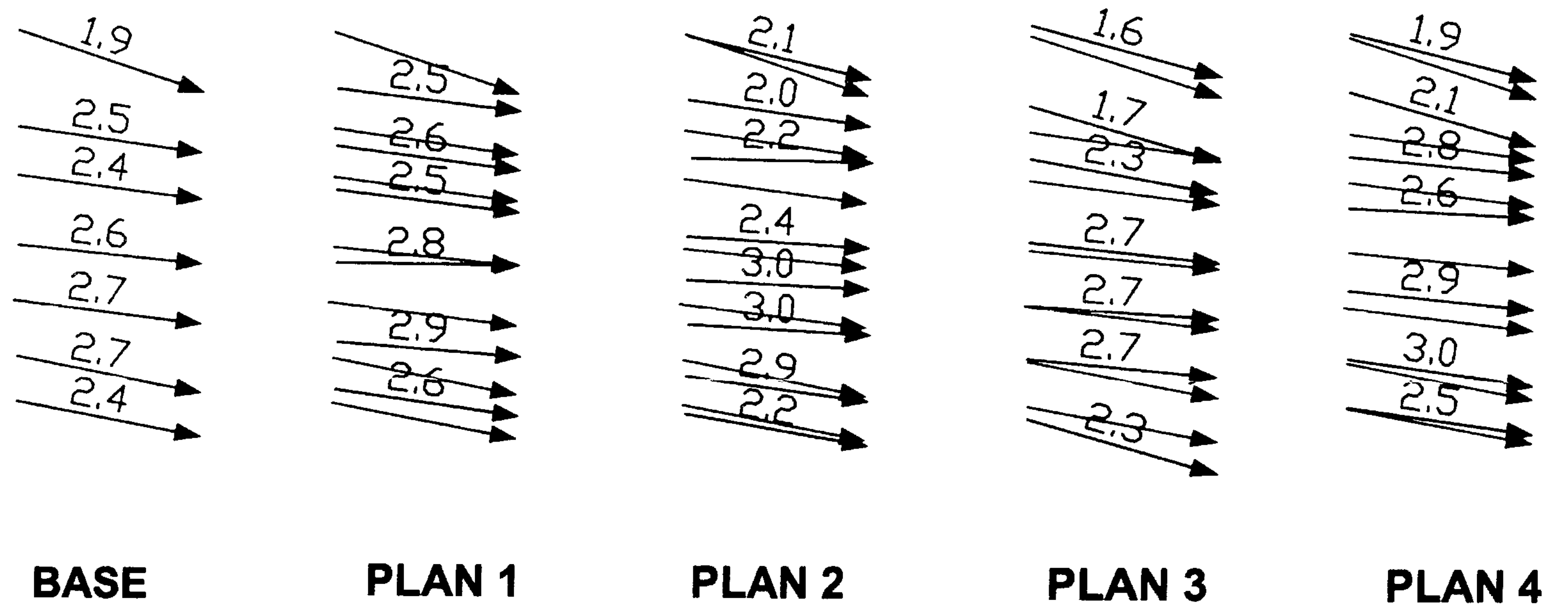
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE E
DISCHARGE - 20,000 CFS
UPPER POOL EL - 136.0 FT



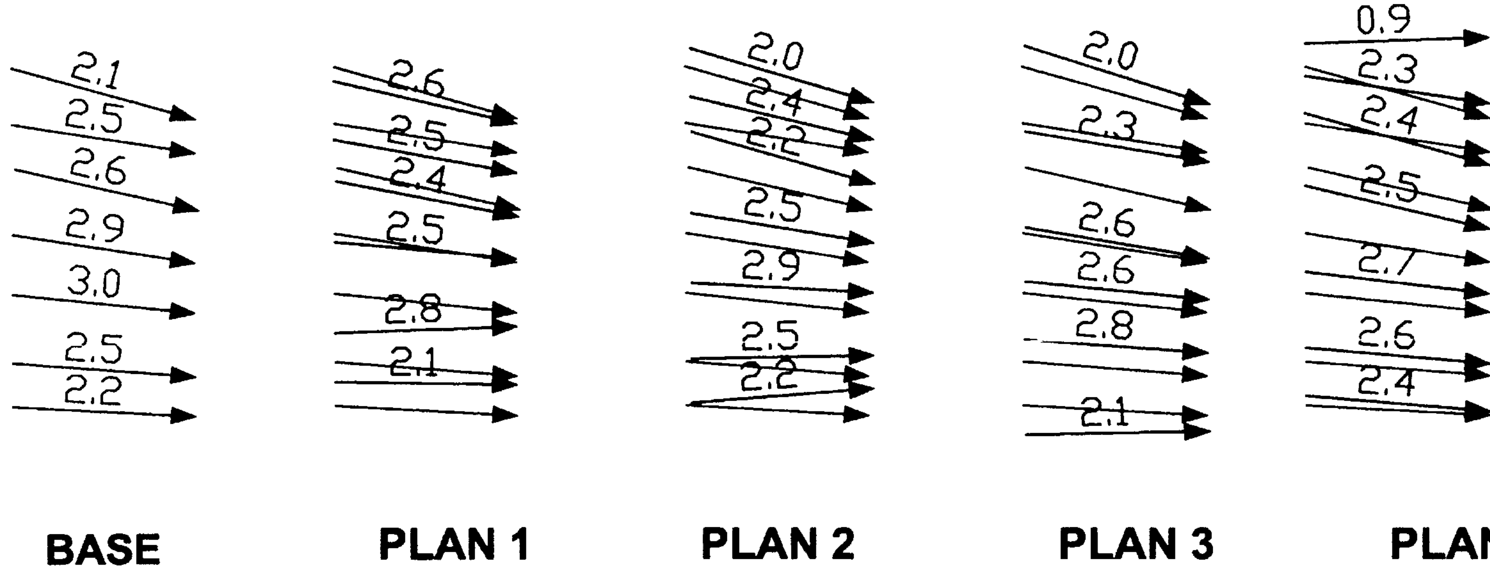
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE A
DISCHARGE - 32,500 CFS
UPPER POOL EL - 136.0 FT



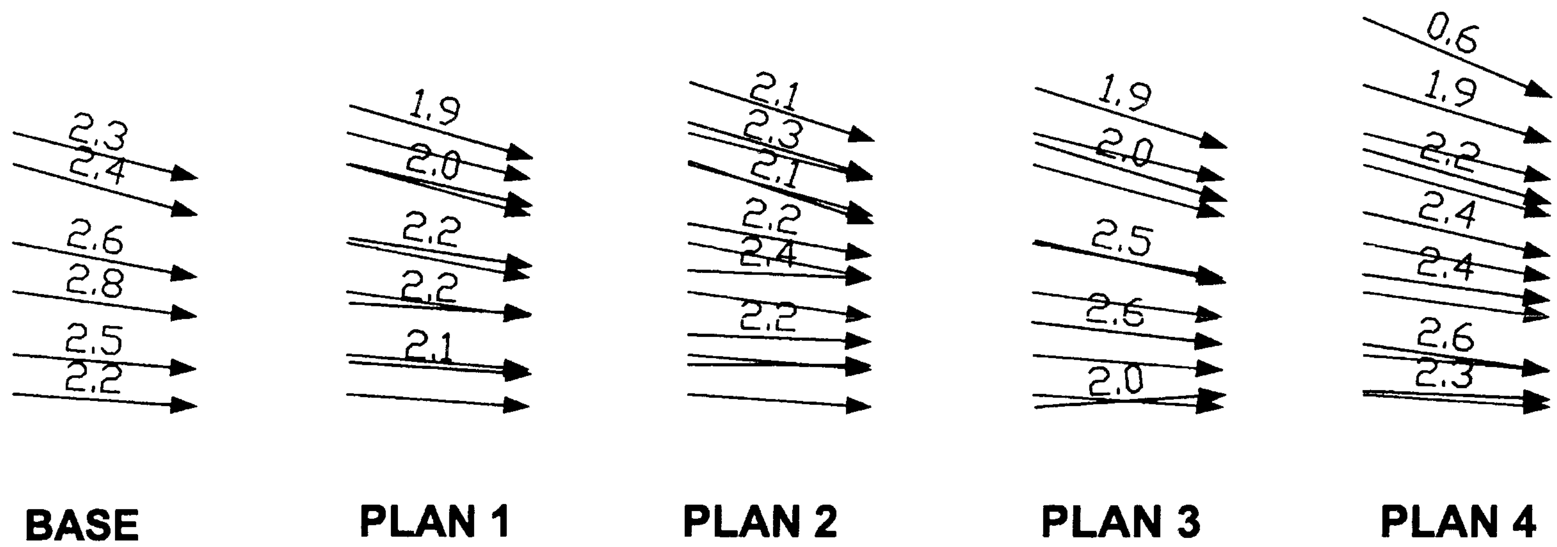
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE B
DISCHARGE - 32,500 CFS
UPPER POOL EL - 136.0 FT



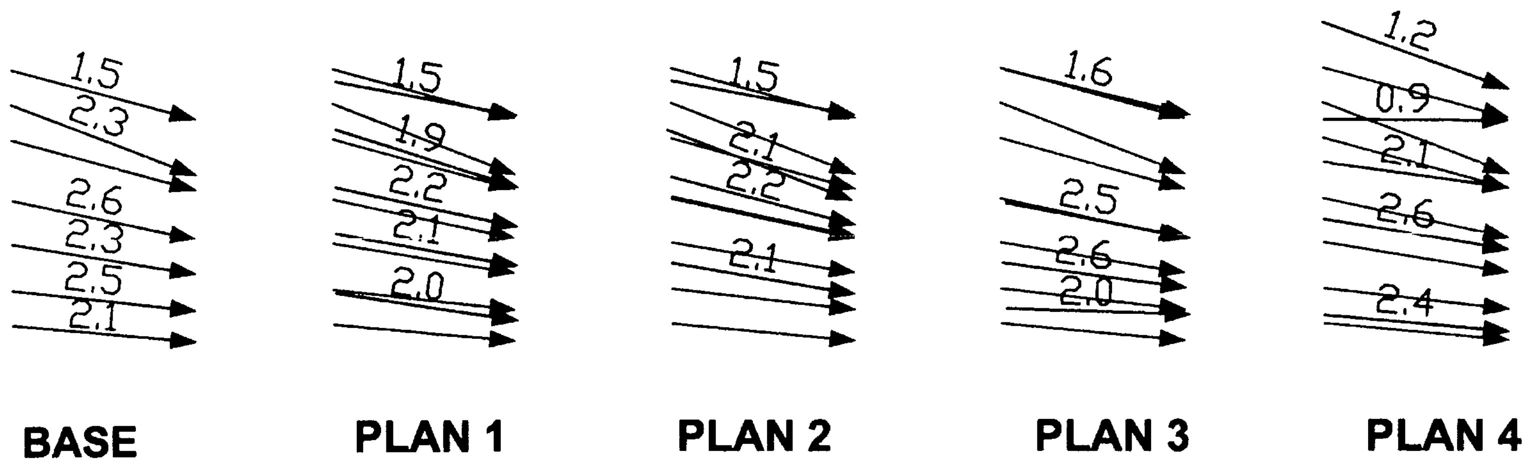
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE C
DISCHARGE - 32,500 CFS
UPPER POOL EL - 136.0 FT



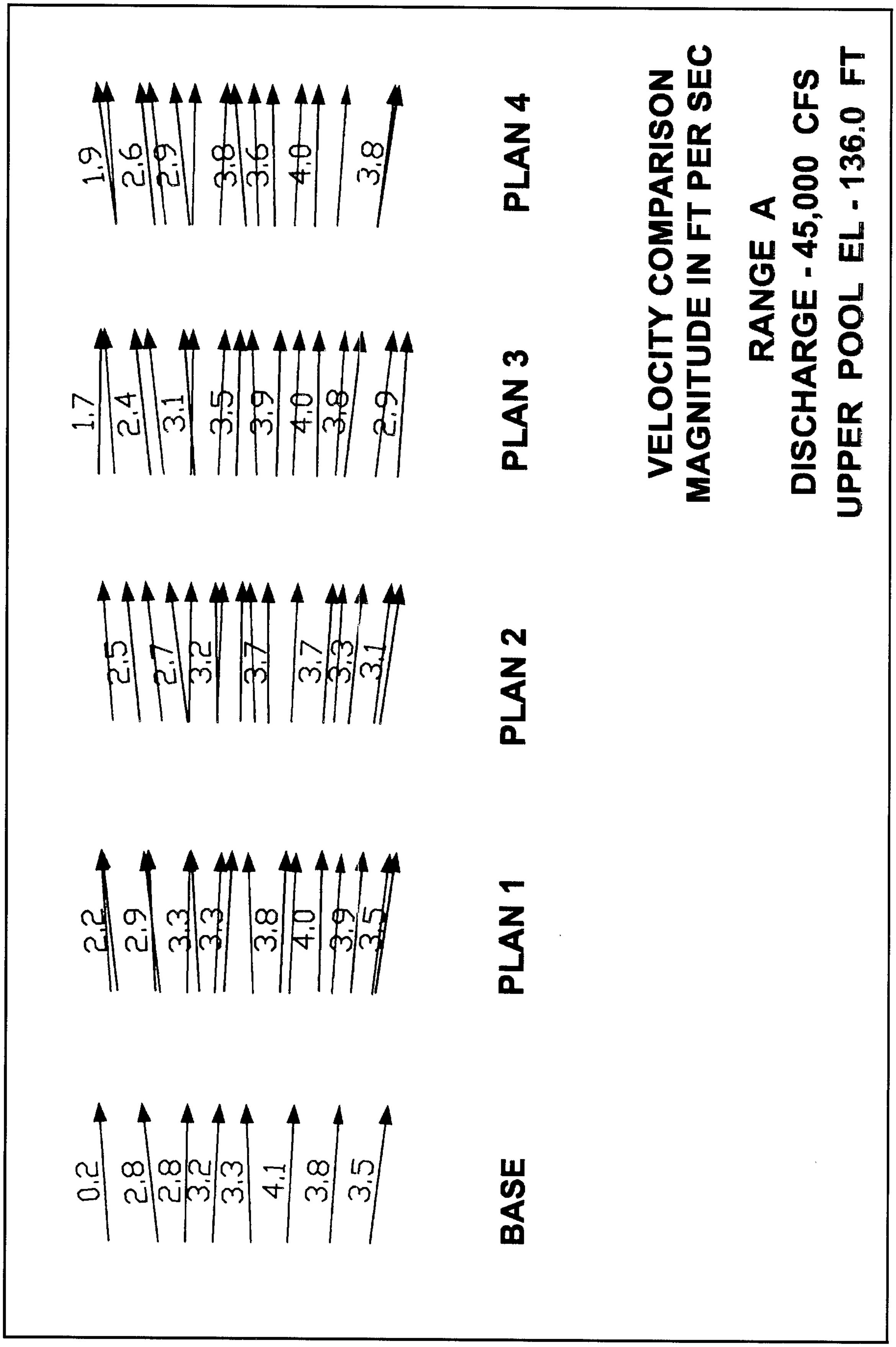
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

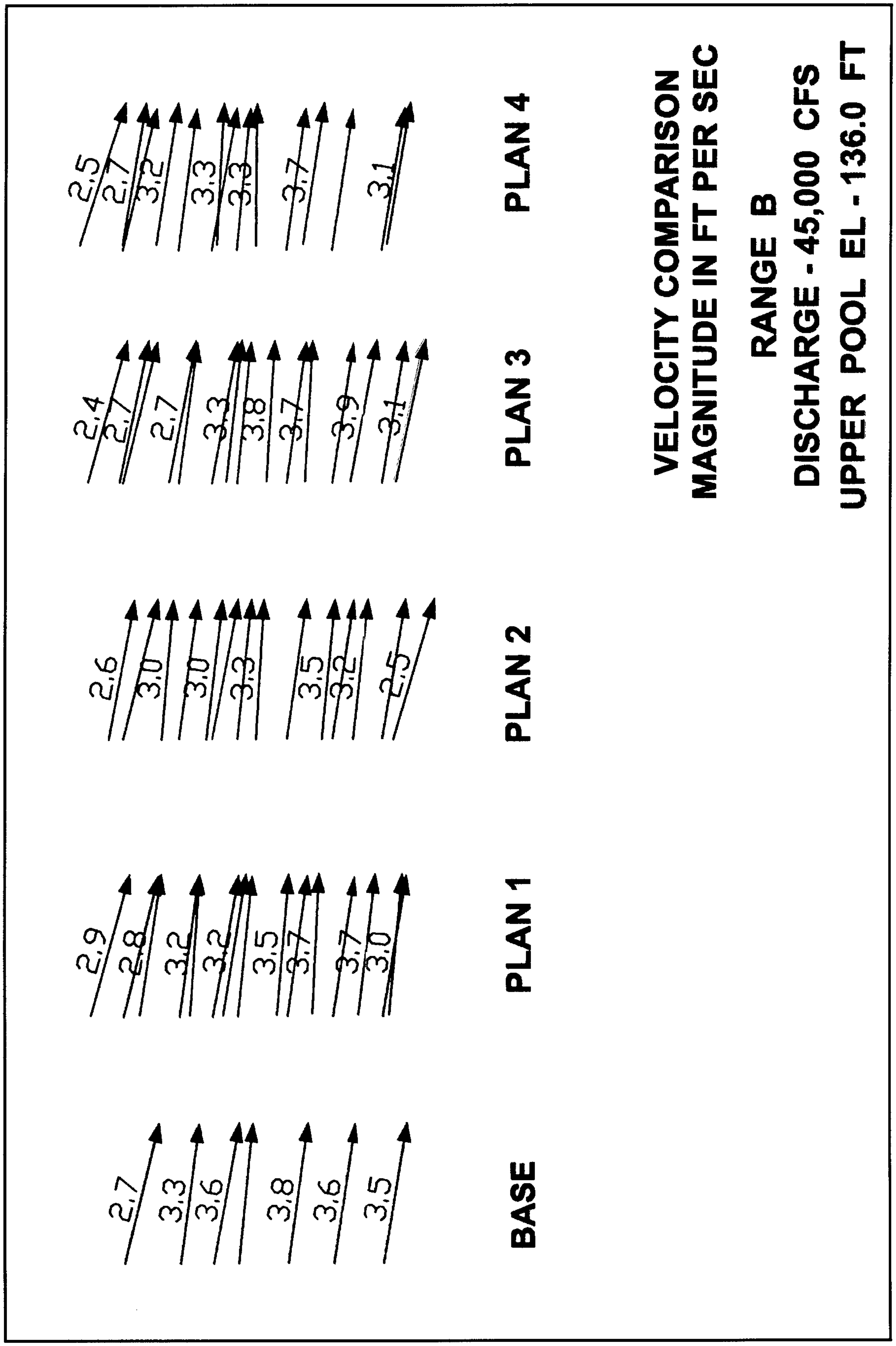
RANGE D
DISCHARGE - 32,500 CFS
UPPER POOL EL - 136.0 FT

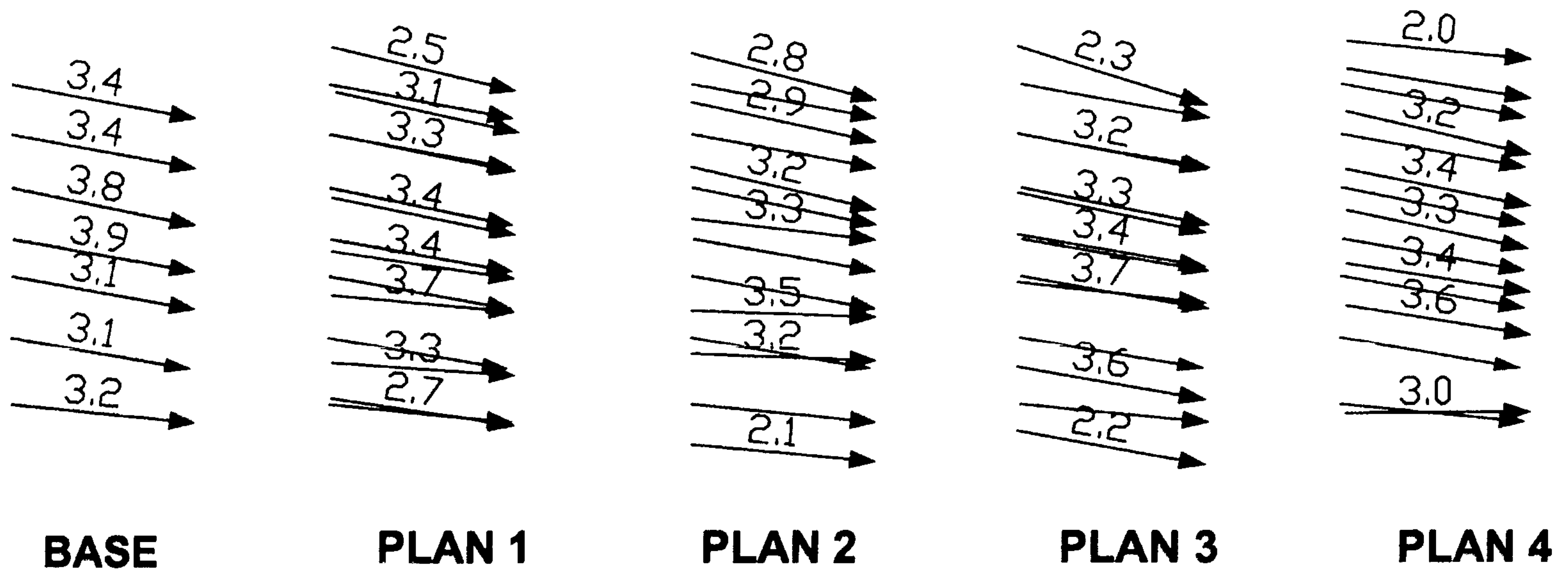


VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE E
DISCHARGE - 32,500 CFS
UPPER POOL EL - 136.0 FT

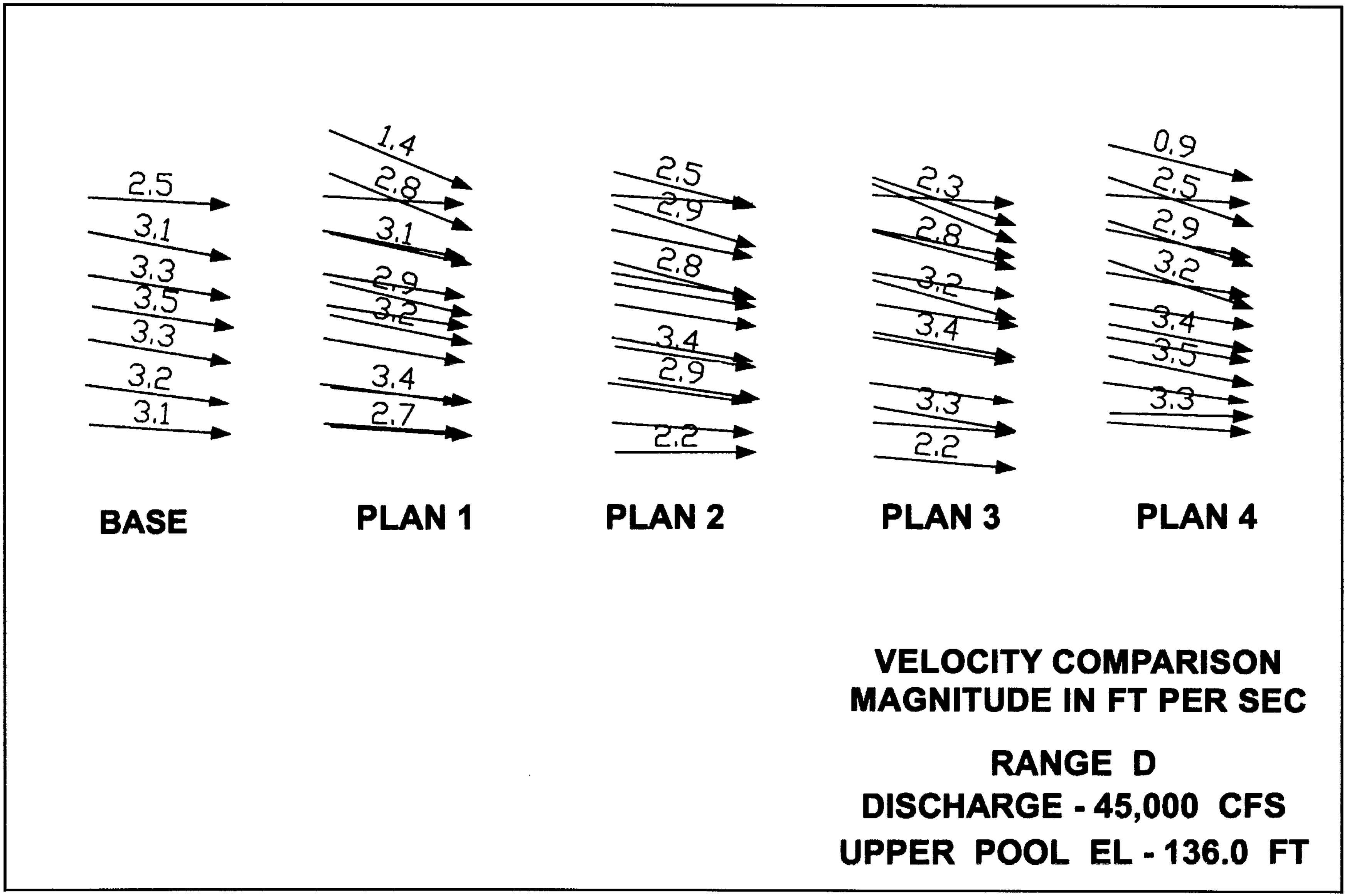

VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC
RANGE A
DISCHARGE - 45,000 CFS
UPPER POOL EL - 136.0 FT
BASE
0.2
2.8
2.8
3.2
3.3
4.1
3.8
3.5
PLAN 1
2.2
2.9
3.3
3.3
3.8
4.0
3.9
3.5
PLAN 2
2.5
2.7
3.2
3.7
3.7
3.3
3.1
PLAN 3
1.7
2.4
3.1
3.5
3.9
4.0
3.8
2.9
PLAN 4
1.9
2.6
2.9
3.8
3.6
4.0
3.8


VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC
RANGE B
DISCHARGE - 45,000 CFS
UPPER POOL EL - 136.0 FT
BASE
2.7
3.3
3.6
3.8
3.6
3.5
PLAN 1
2.9
2.8
3.2
3.2
3.5
3.7
3.7
3.0
PLAN 2
2.6
3.0
3.0
3.3
3.5
3.2
2.5
PLAN 3
2.4
2.7
2.7
3.3
3.8
3.7
3.9
3.1
PLAN 4
2.5
2.7
3.2
3.3
3.3
3.7
3.1

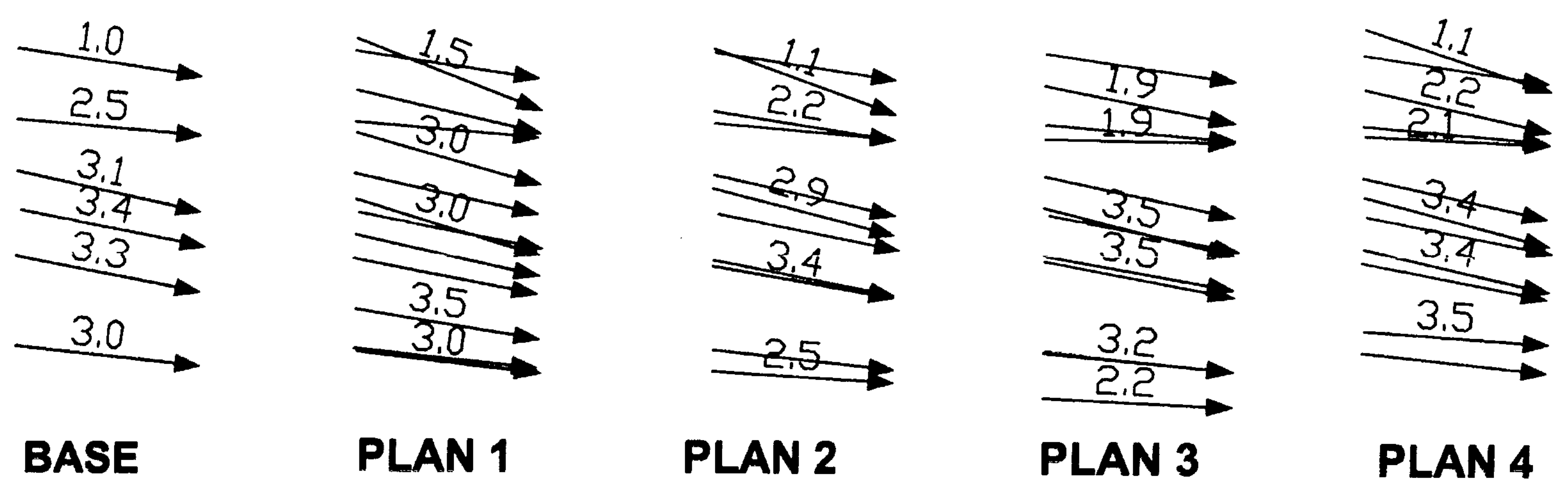


VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE C
DISCHARGE - 45,000 CFS
UPPER POOL EL - 136.0 FT

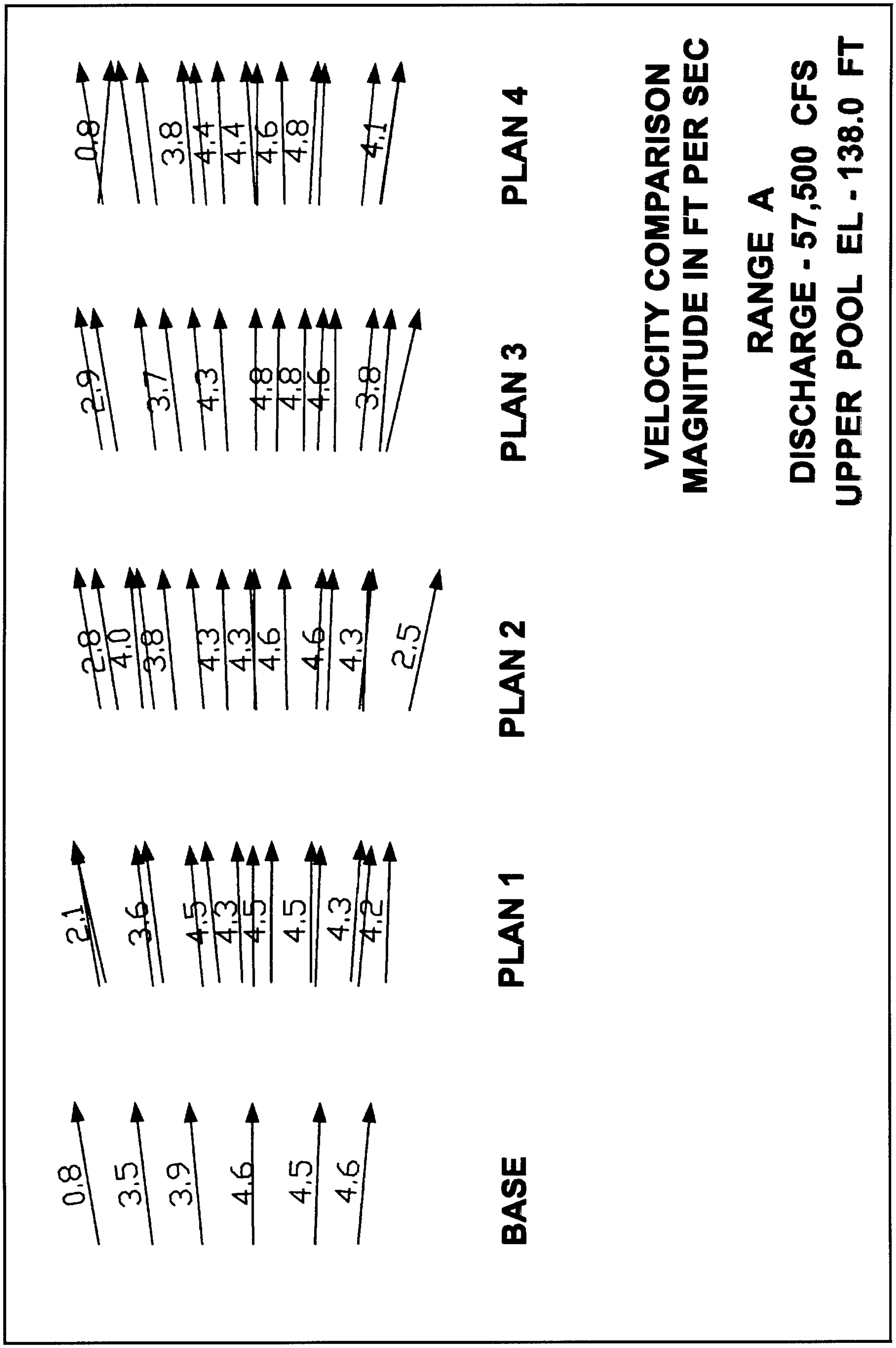


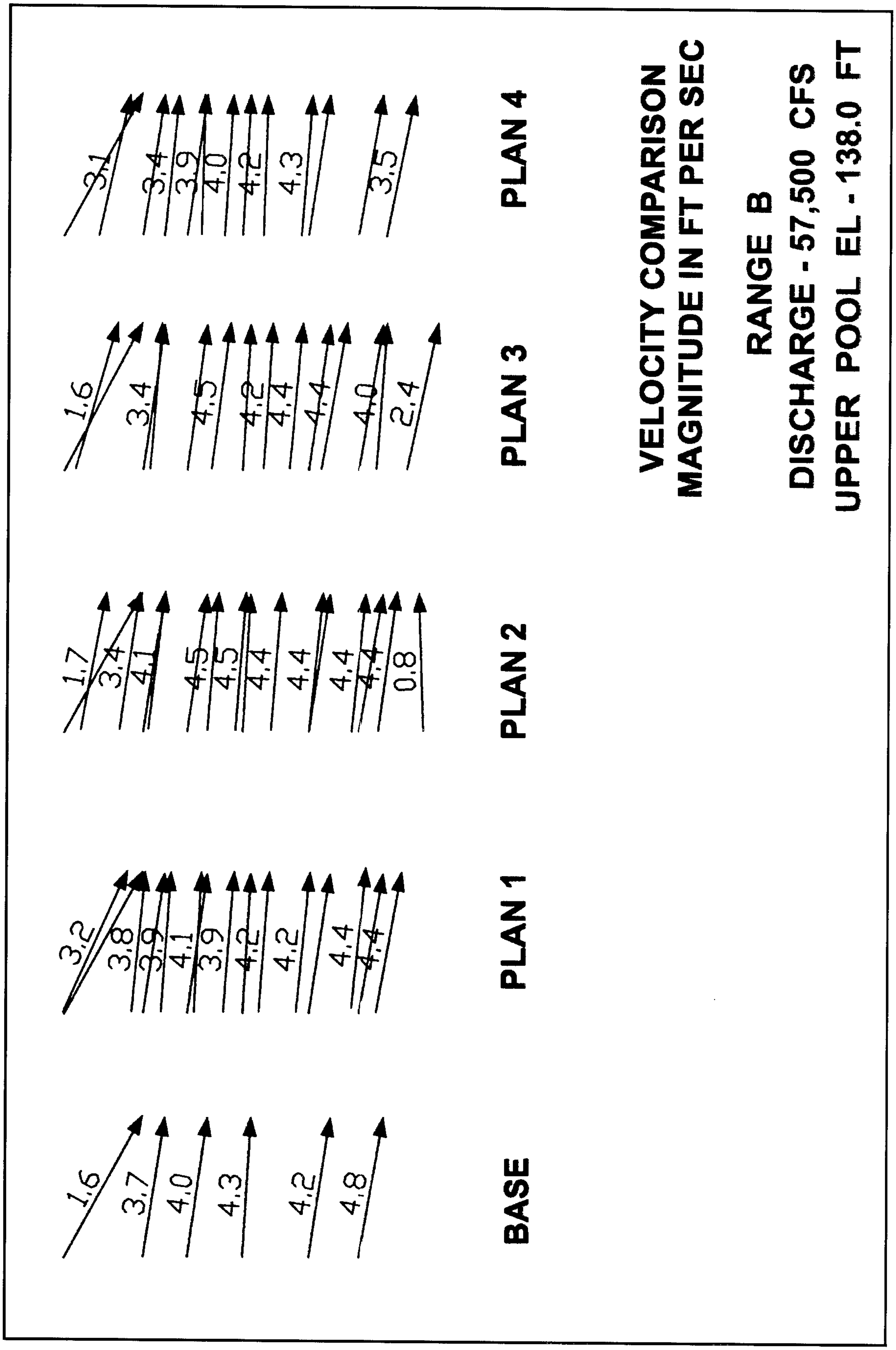
2.5
3.1
3.3
3.5
3.3
3.2
3.1
BASE
1.4
2.8
3.1
2.9
3.2
3.4
2.7
PLAN 1
2.5
2.9
2.8
3.4
2.9
2.2
PLAN 2
2.3
2.8
3.2
3.4
3.3
2.2
PLAN 3
0.9
2.5
2.9
3.2
3.4
3.5
3.3
PLAN 4
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC
RANGE D
DISCHARGE - 45,000 CFS
UPPER POOL EL - 136.0 FT

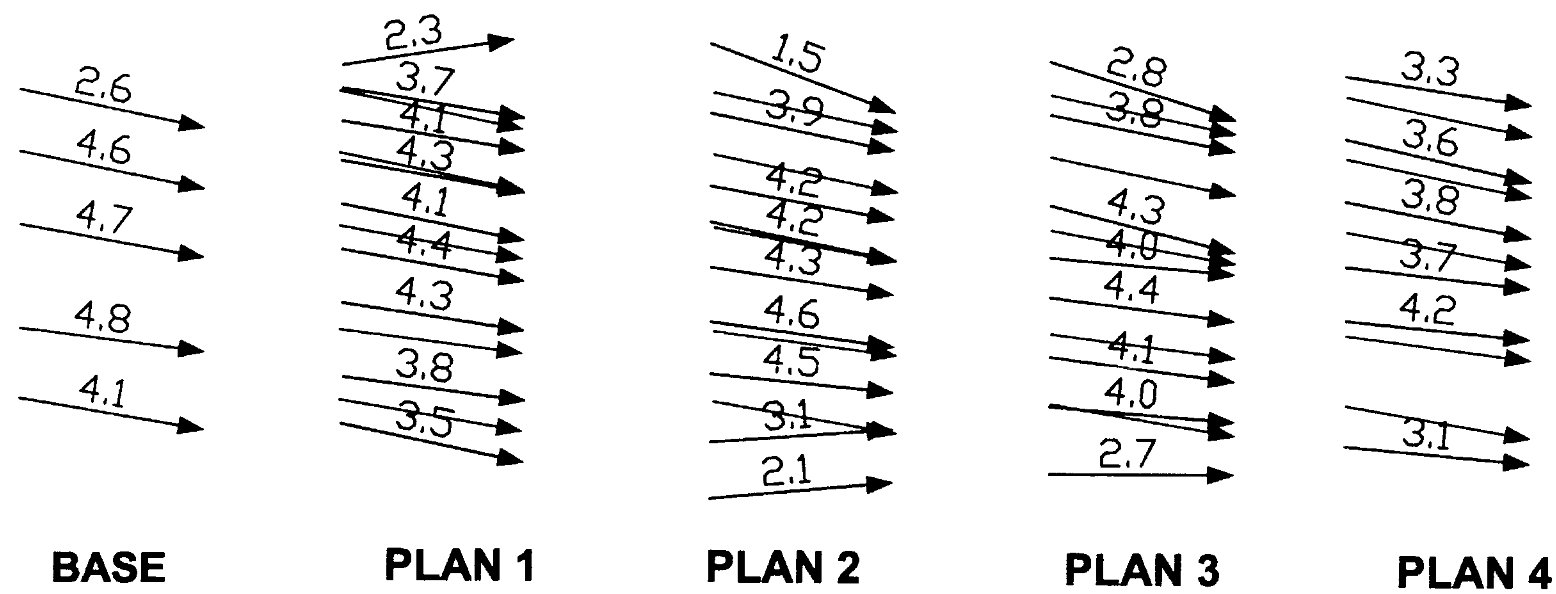


VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE E
DISCHARGE - 45,000 CFS
UPPER POOL EL - 136.0 FT


VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC
RANGE A
DISCHARGE - 57,500 CFS
UPPER POOL EL - 138.0 FT
BASE
0.8
3.5
3.9
4.6
4.5
4.6
PLAN 1
2.1
3.6
4.5
4.3
4.5
4.5
4.3
4.2
PLAN 2
2.8
4.0
3.8
4.3
4.3
4.6
4.6
4.3
2.5
PLAN 3
2.9
3.7
4.3
4.8
4.8
4.6
3.8
PLAN 4
0.8
3.8
4.4
4.4
4.6
4.8
4.1


VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC
RANGE B
DISCHARGE - 57,500 CFS
UPPER POOL EL - 138.0 FT
BASE
1.6
3.7
4.0
4.3
4.2
4.8
PLAN 1
3.2
3.8
3.9
4.1
3.9
4.2
4.2
4.4
4.4
PLAN 2
1.7
3.4
4.1
4.5
4.5
4.4
4.4
4.4
4.4
0.8
PLAN 3
1.6
3.4
4.5
4.2
4.4
4.4
4.0
2.4
PLAN 4
3.1
3.4
3.9
4.0
4.2
4.3
3.5

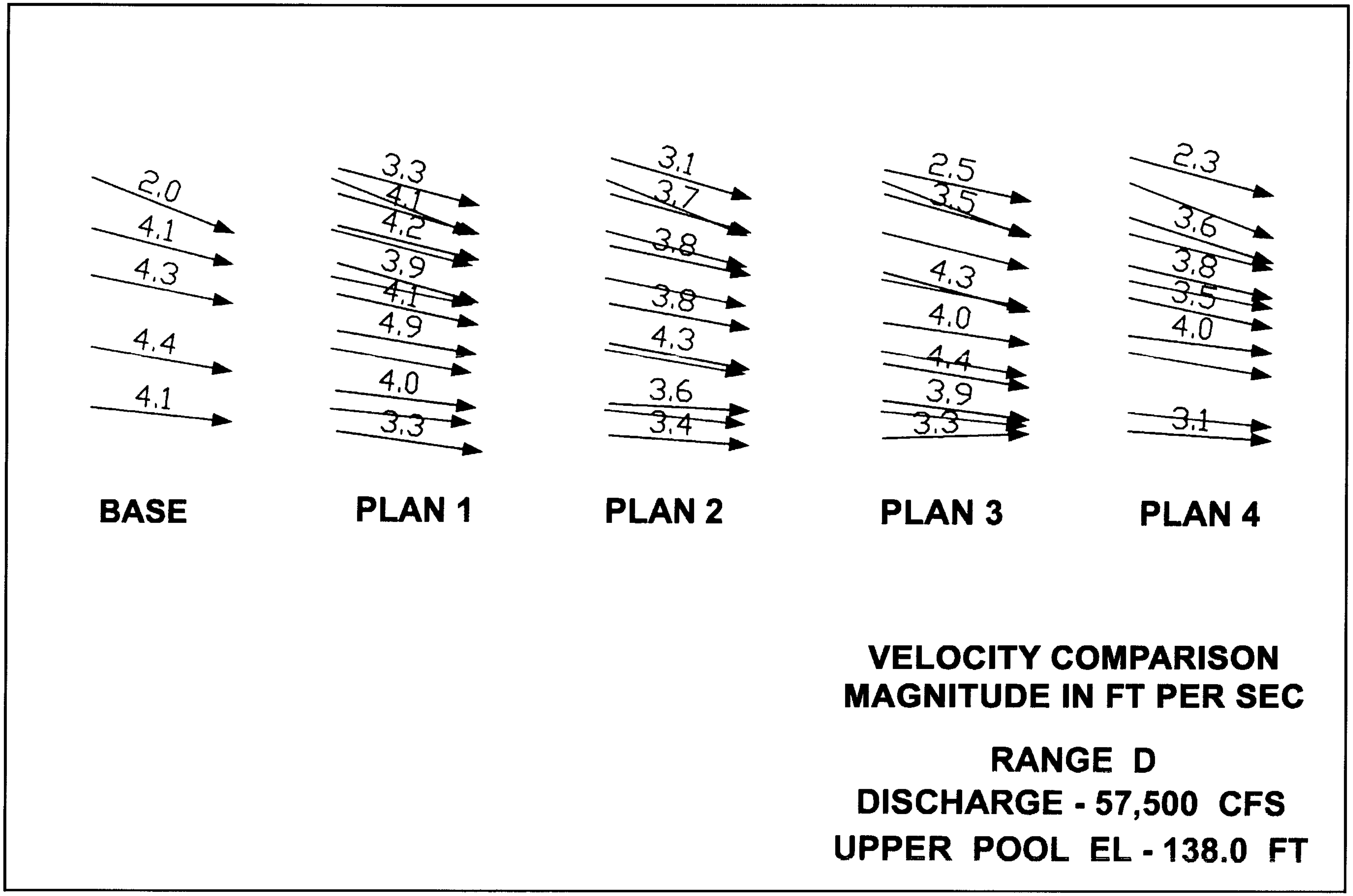


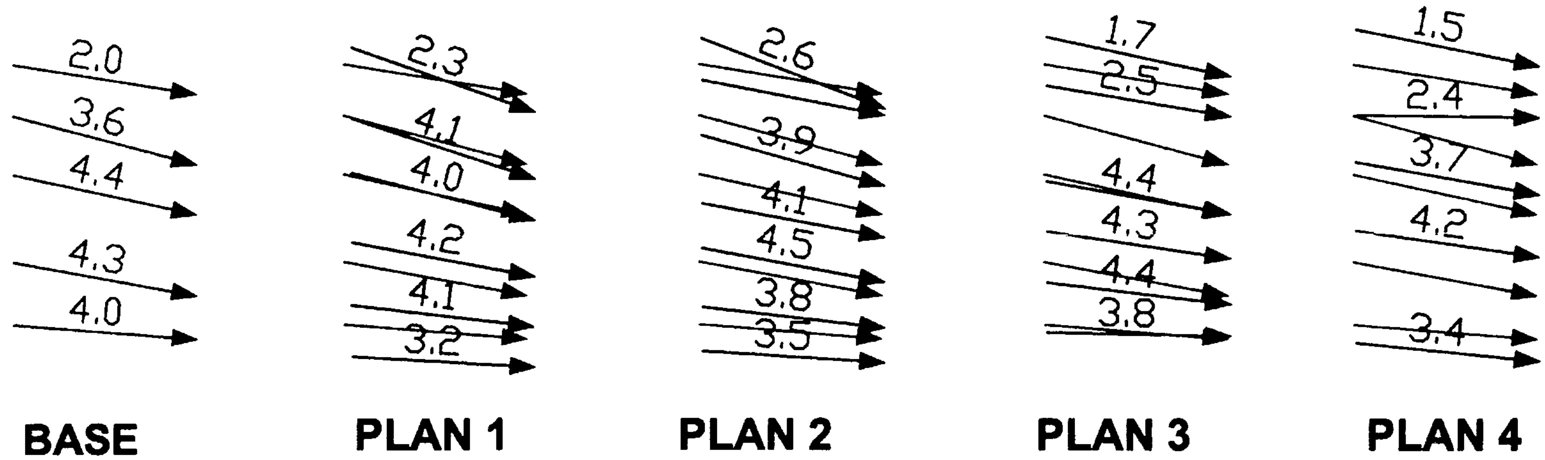
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE C

DISCHARGE - 57,500 CFS

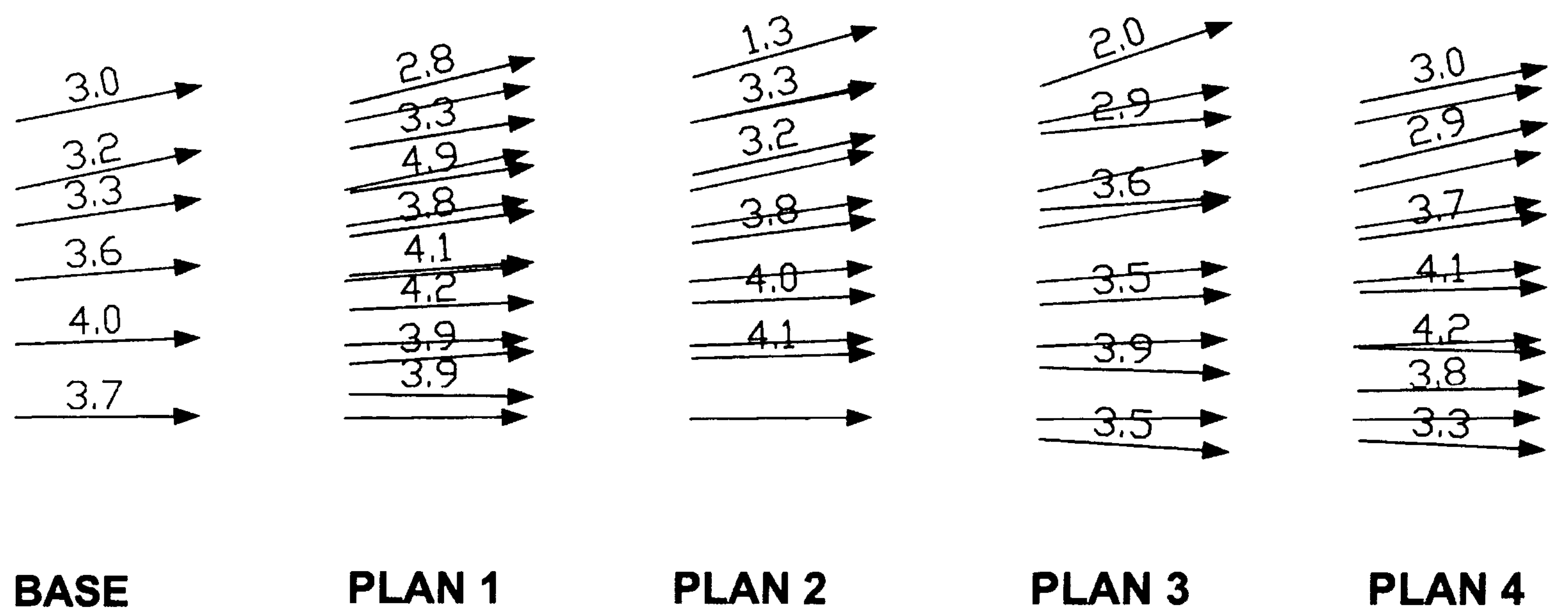
UPPER POOL EL - 138.0 FT


2.0
4.1
4.3
4.4
4.1
BASE
3.3
4.1
4.2
3.9
4.1
4.9
4.0
3.3
PLAN 1
3.1
3.7
3.8
3.8
4.3
3.6
3.4
PLAN 2
2.5
3.5
4.3
4.0
4.4
3.9
3.3
PLAN 3
2.3
3.6
3.8
3.5
4.0
3.1
PLAN 4
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC
RANGE D
DISCHARGE - 57,500 CFS
UPPER POOL EL - 138.0 FT



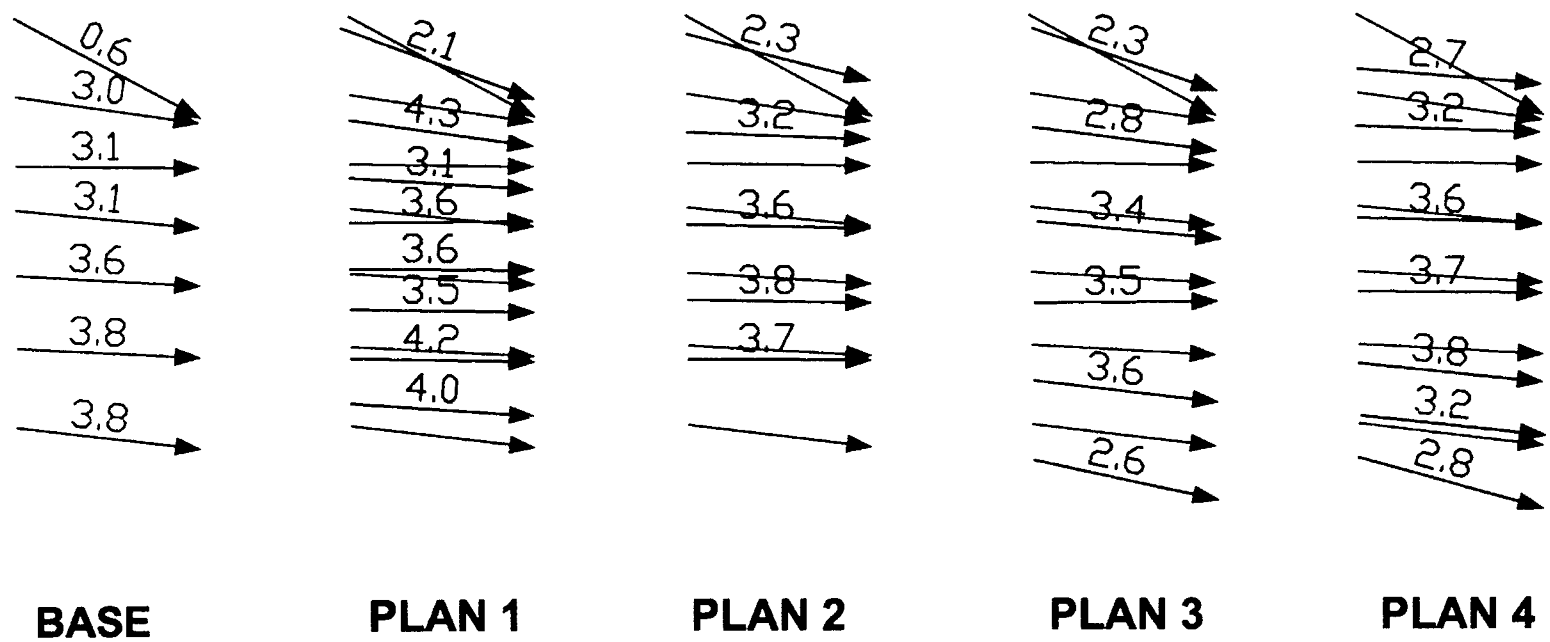
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE E
DISCHARGE - 57,500 CFS
UPPER POOL EL - 138.0 FT



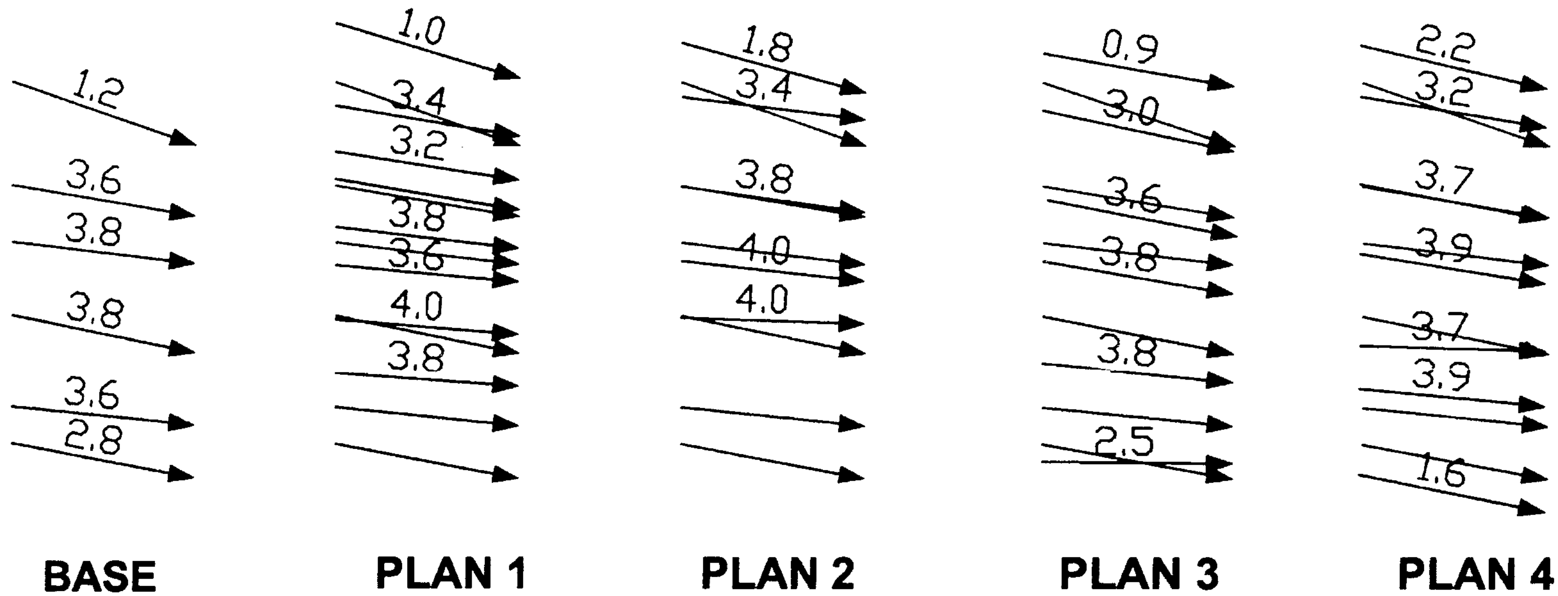
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE A
DISCHARGE - 70,000 CFS
UPPER POOL EL - 141.2 FT



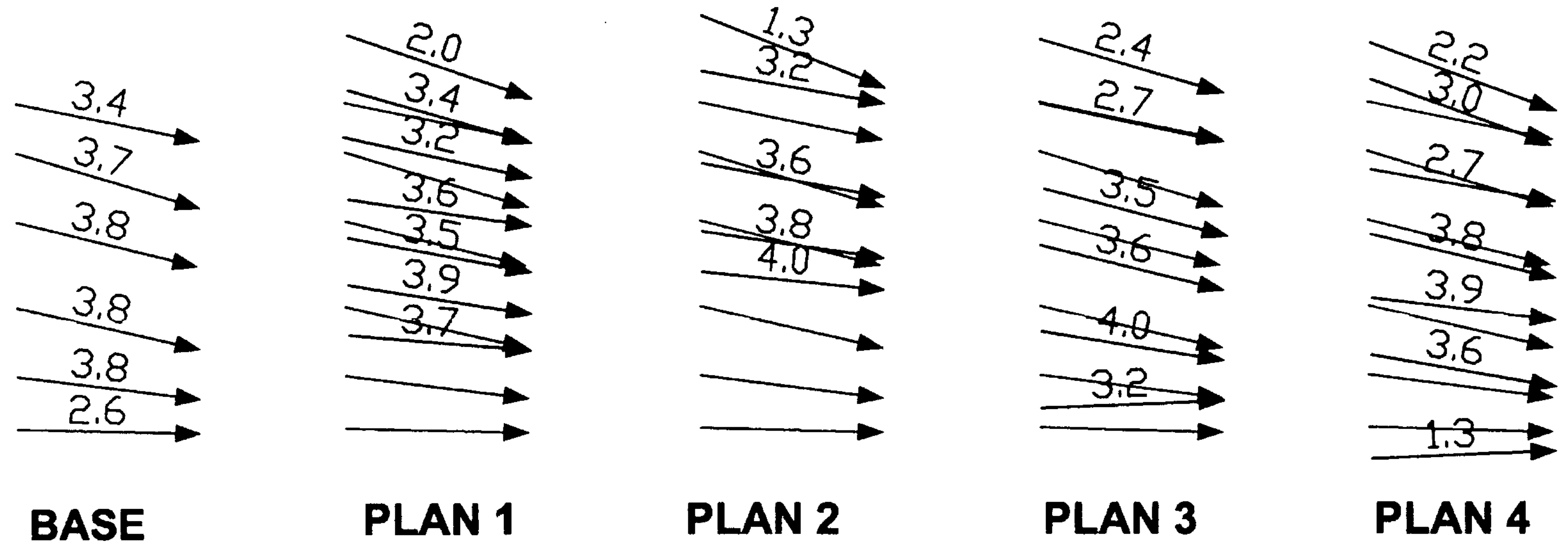
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE B
DISCHARGE - 70,000 CFS
UPPER POOL EL - 141.2 FT



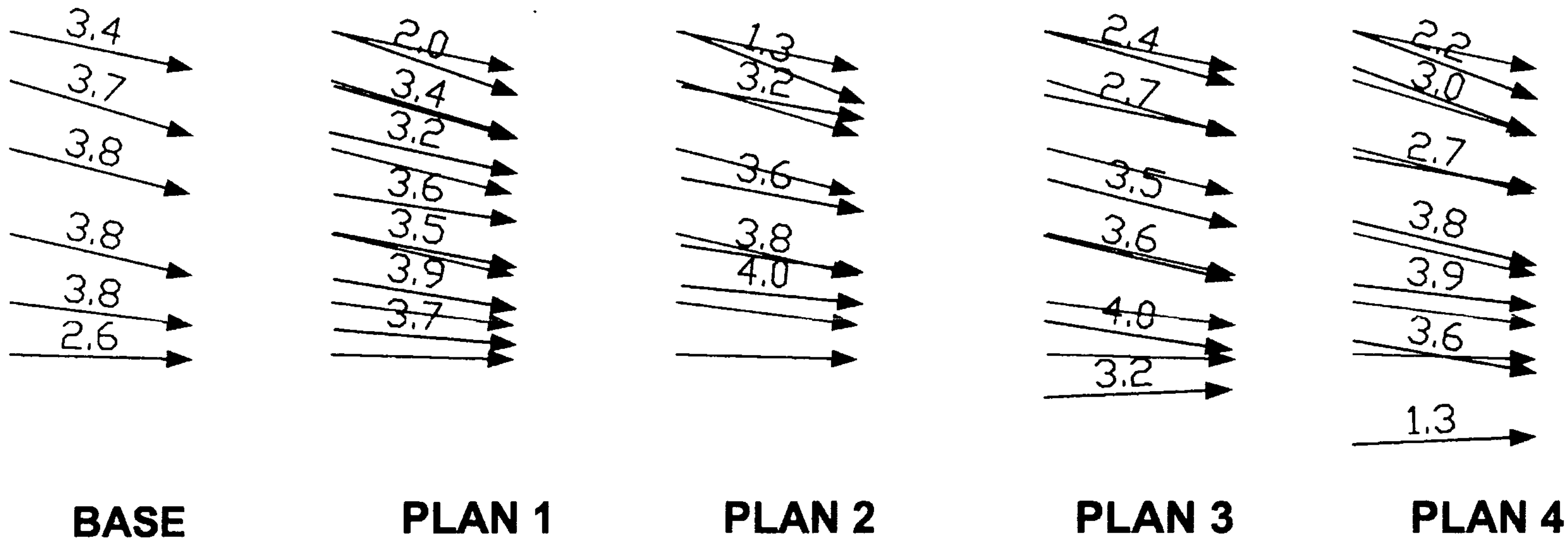
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

RANGE C
DISCHARGE - 70,000 CFS
UPPER POOL EL - 141.2 FT



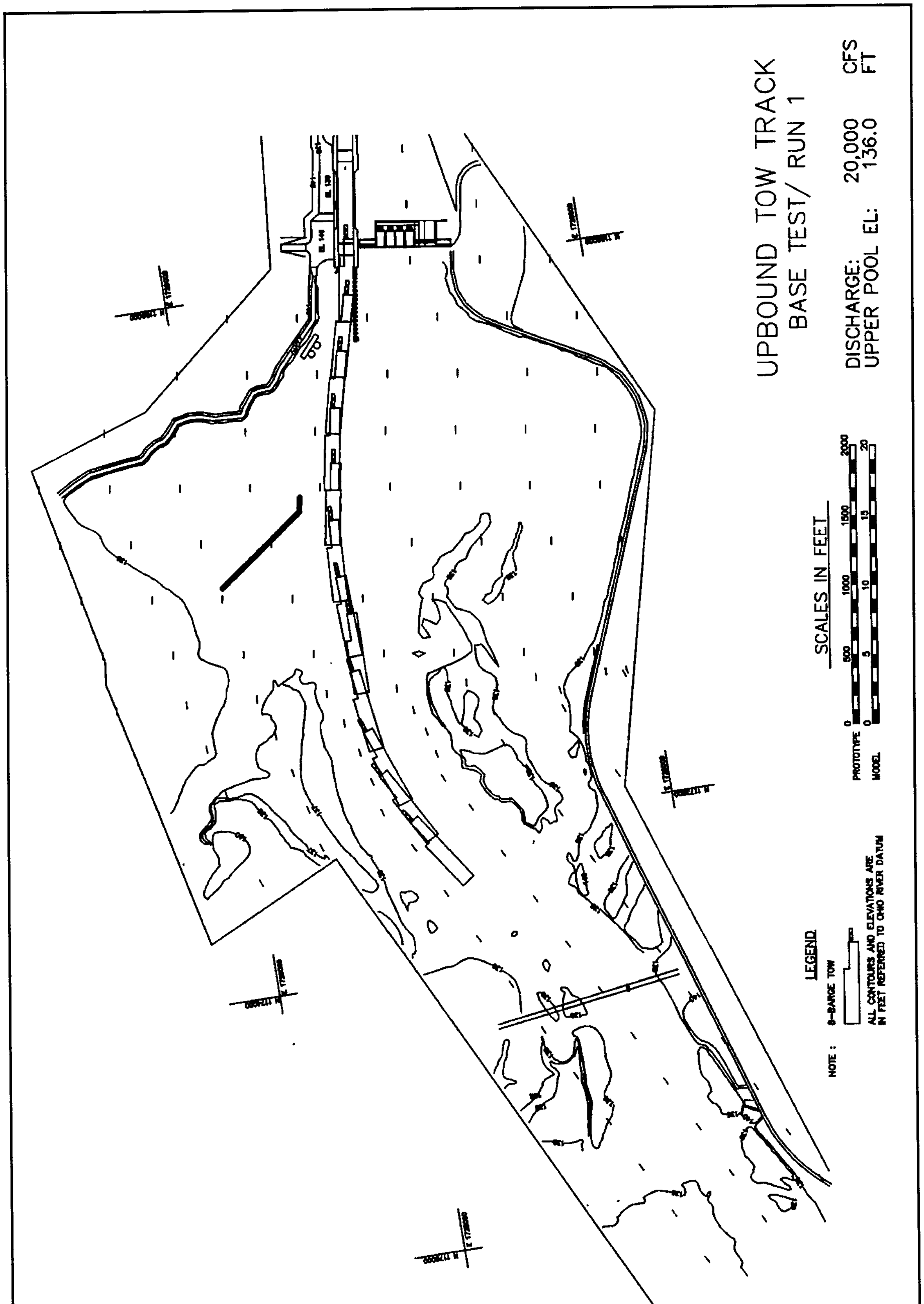
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

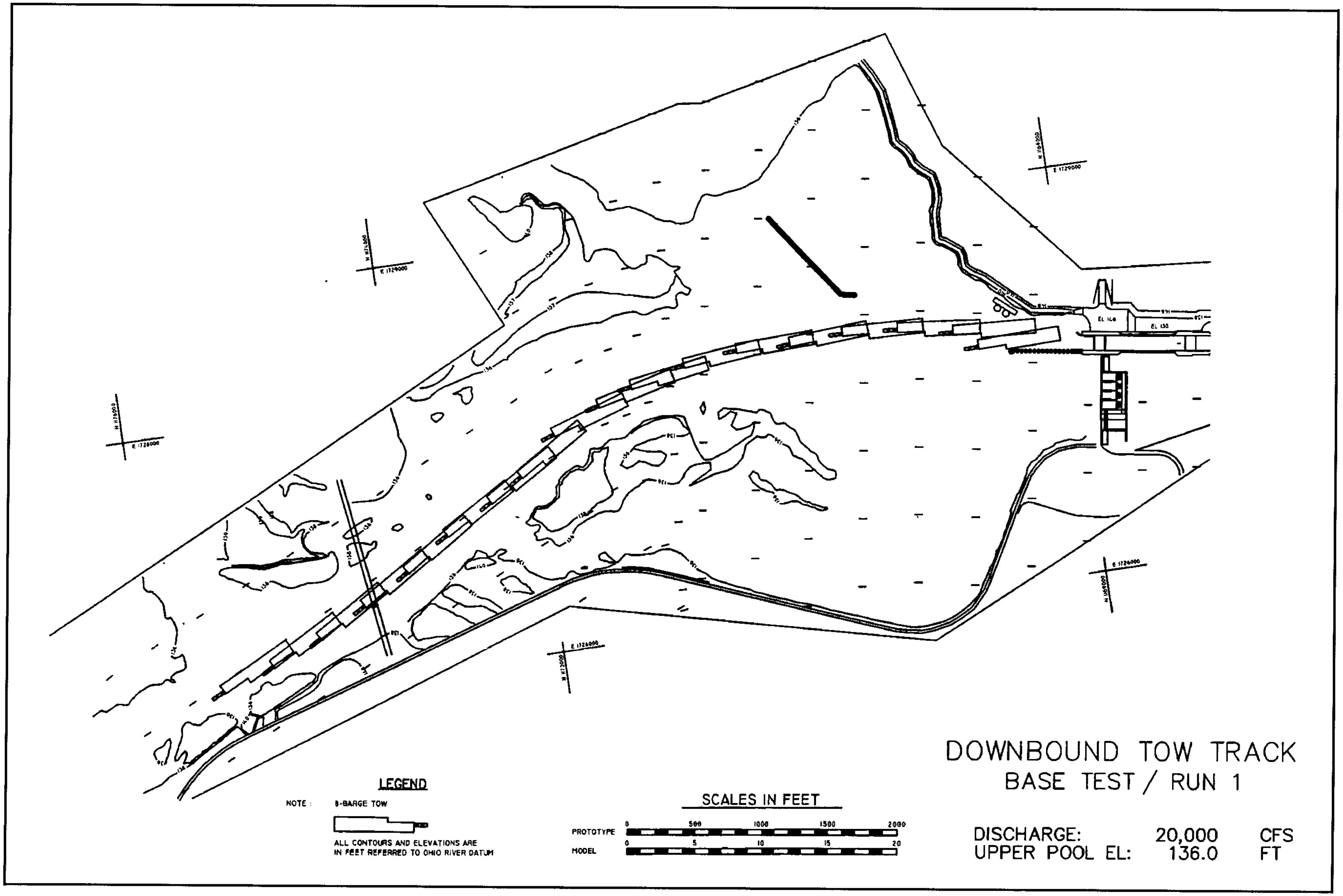
RANGE D
DISCHARGE - 70,000 CFS
UPPER POOL EL - 141.2 FT

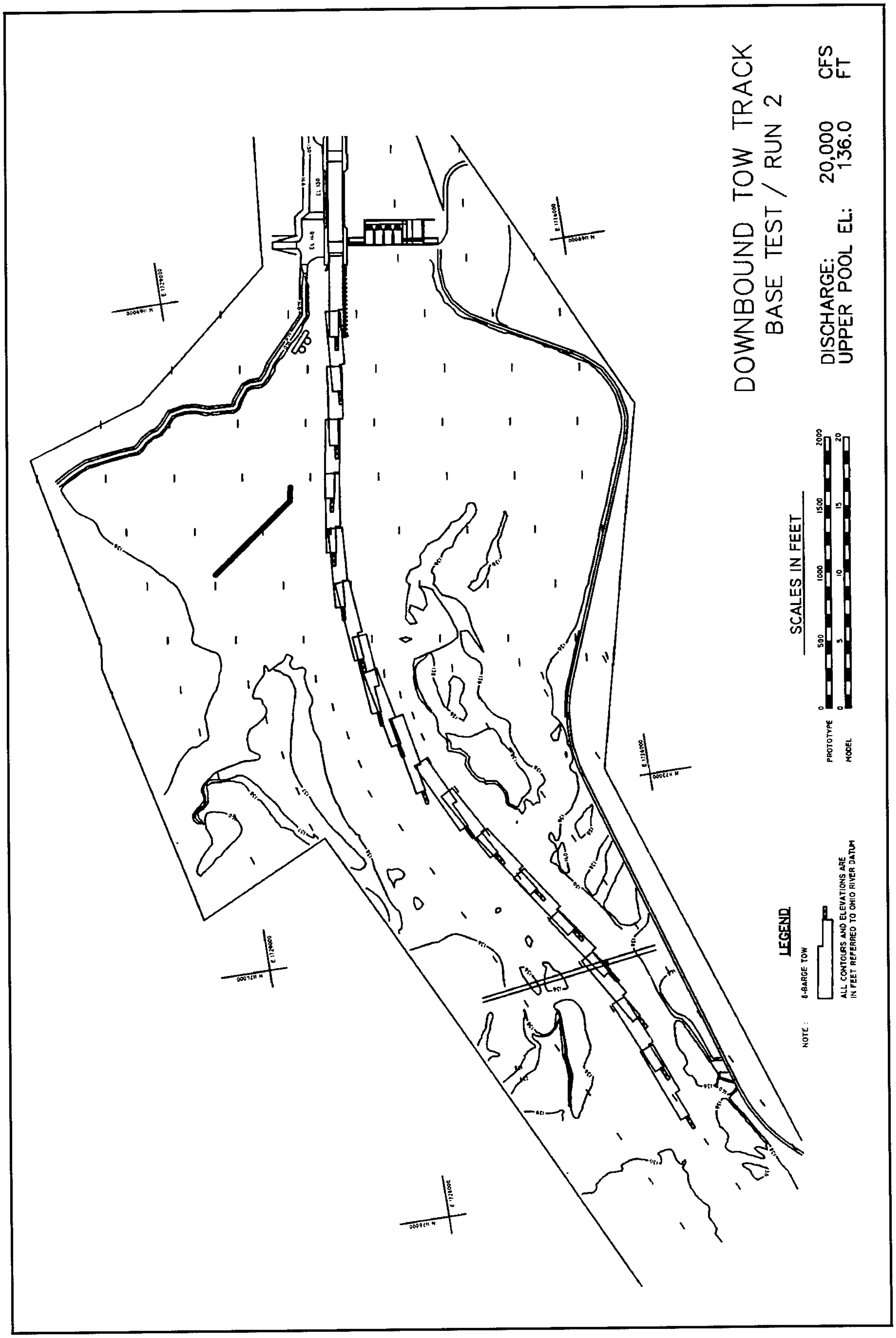


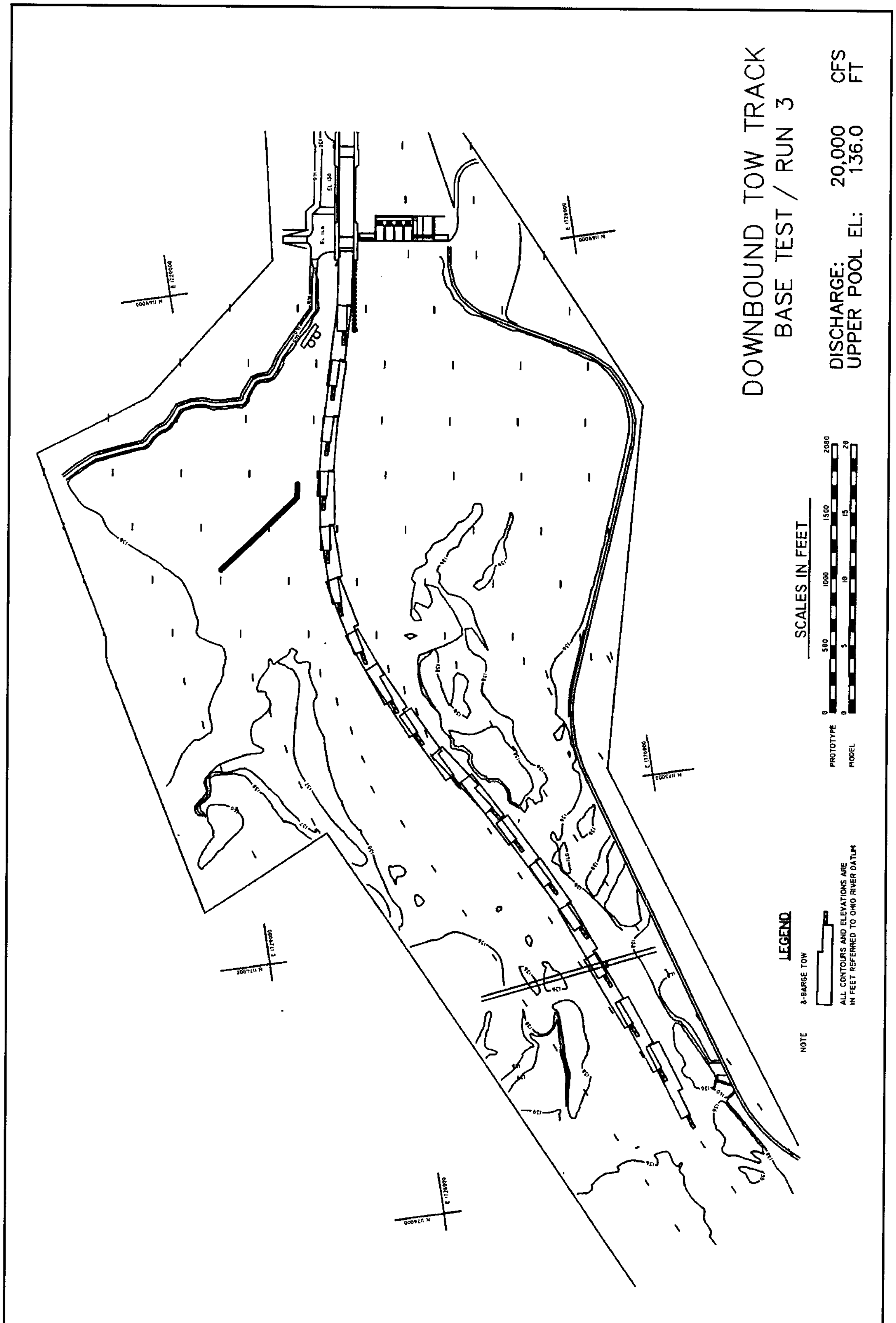
VELOCITY COMPARISON
MAGNITUDE IN FT PER SEC

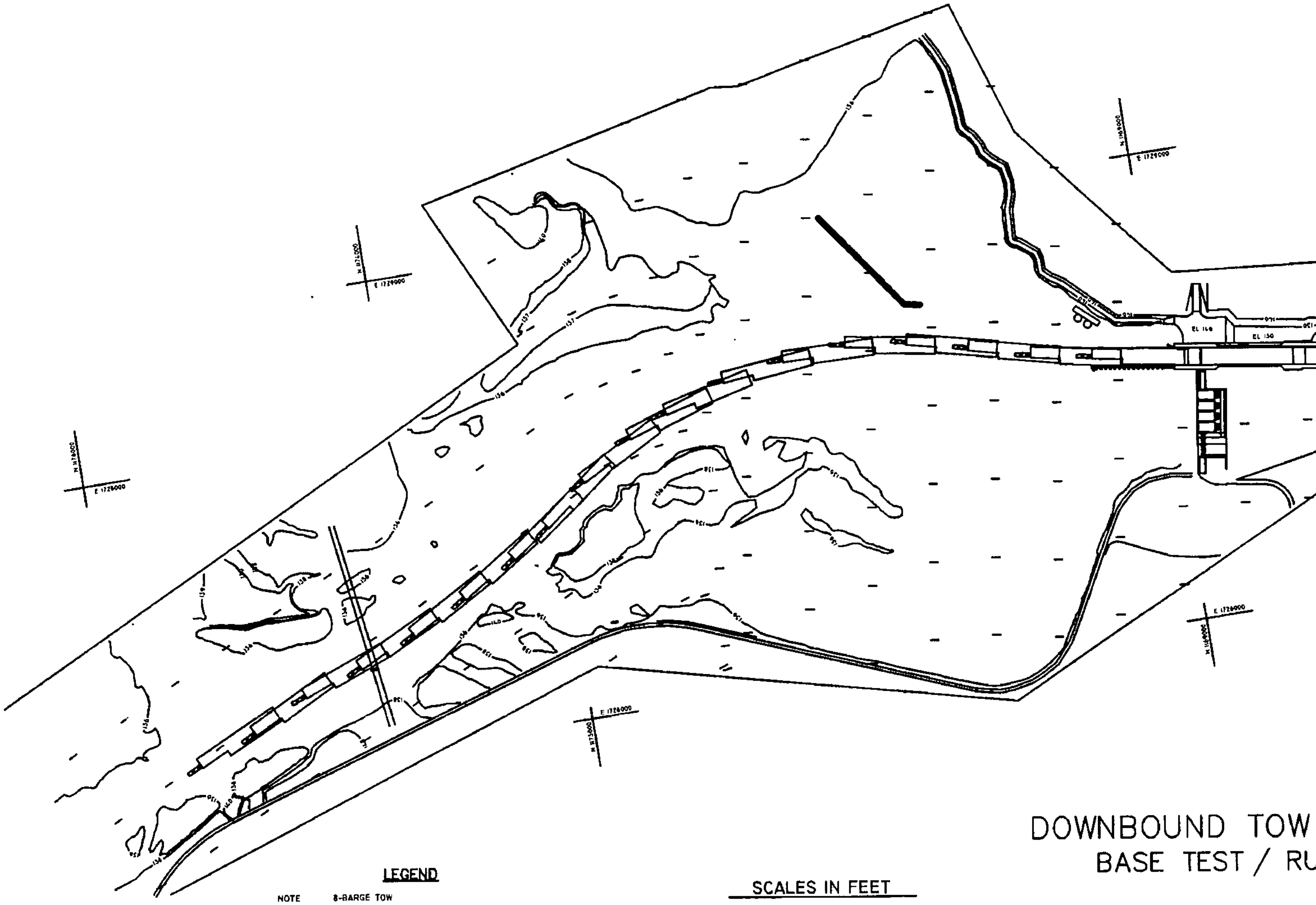
RANGE E
DISCHARGE - 70,000 CFS
UPPER POOL EL - 141.2 FT


UPBOUND TOW TRACK
BASE TEST/ RUN 1
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE: 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
BASE TEST / RUN 1
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE:
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 140
EL 130


DOWNBOUND TOW TRACK
BASE TEST / RUN 2
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE: ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
BASE TEST / RUN 3
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
BASE TEST / RUN 4

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT

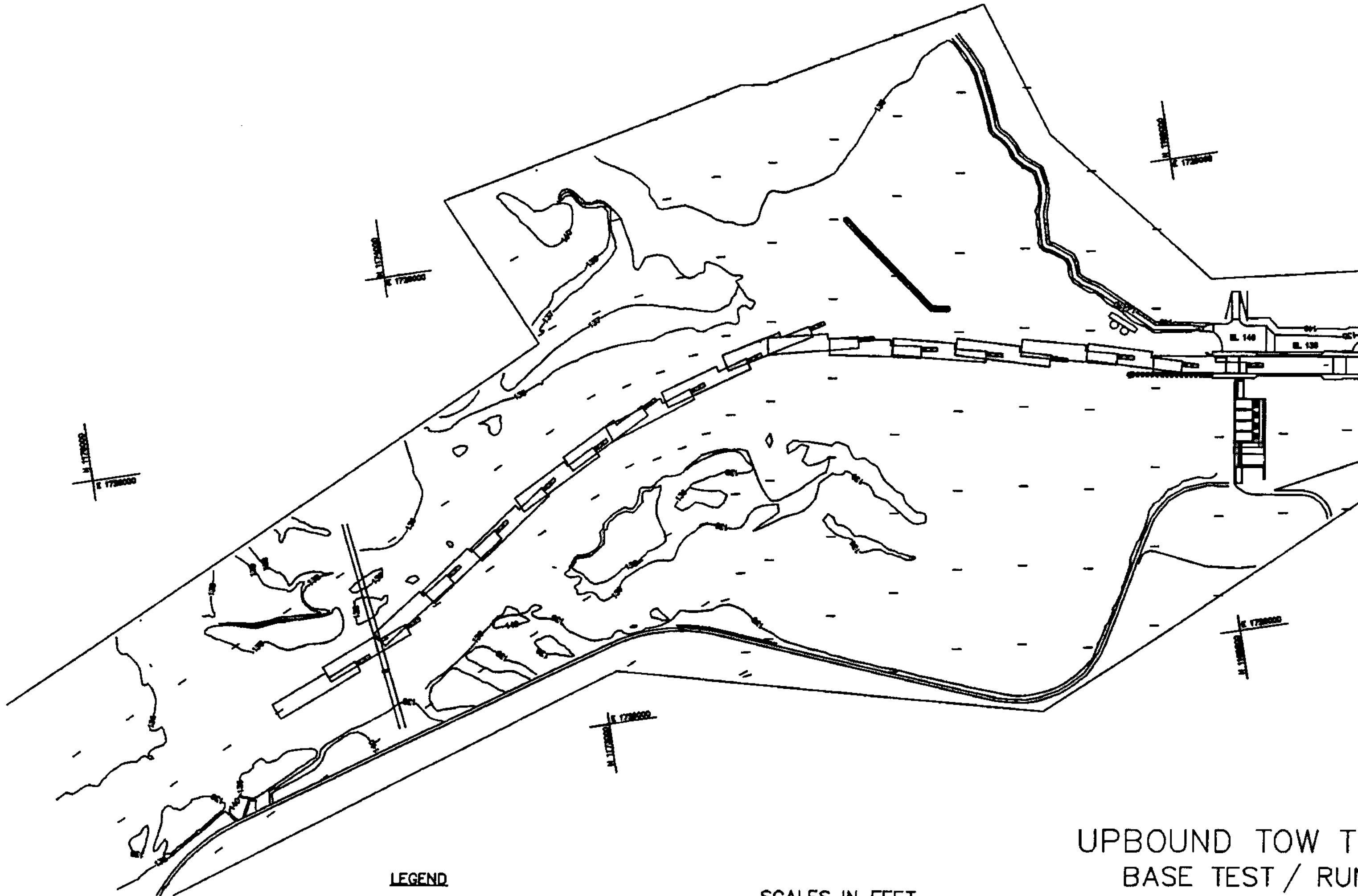
LEGEND

8-BARGE TOW

NOTE
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



UPBOUND TOW TRACK
BASE TEST / RUN 1

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT

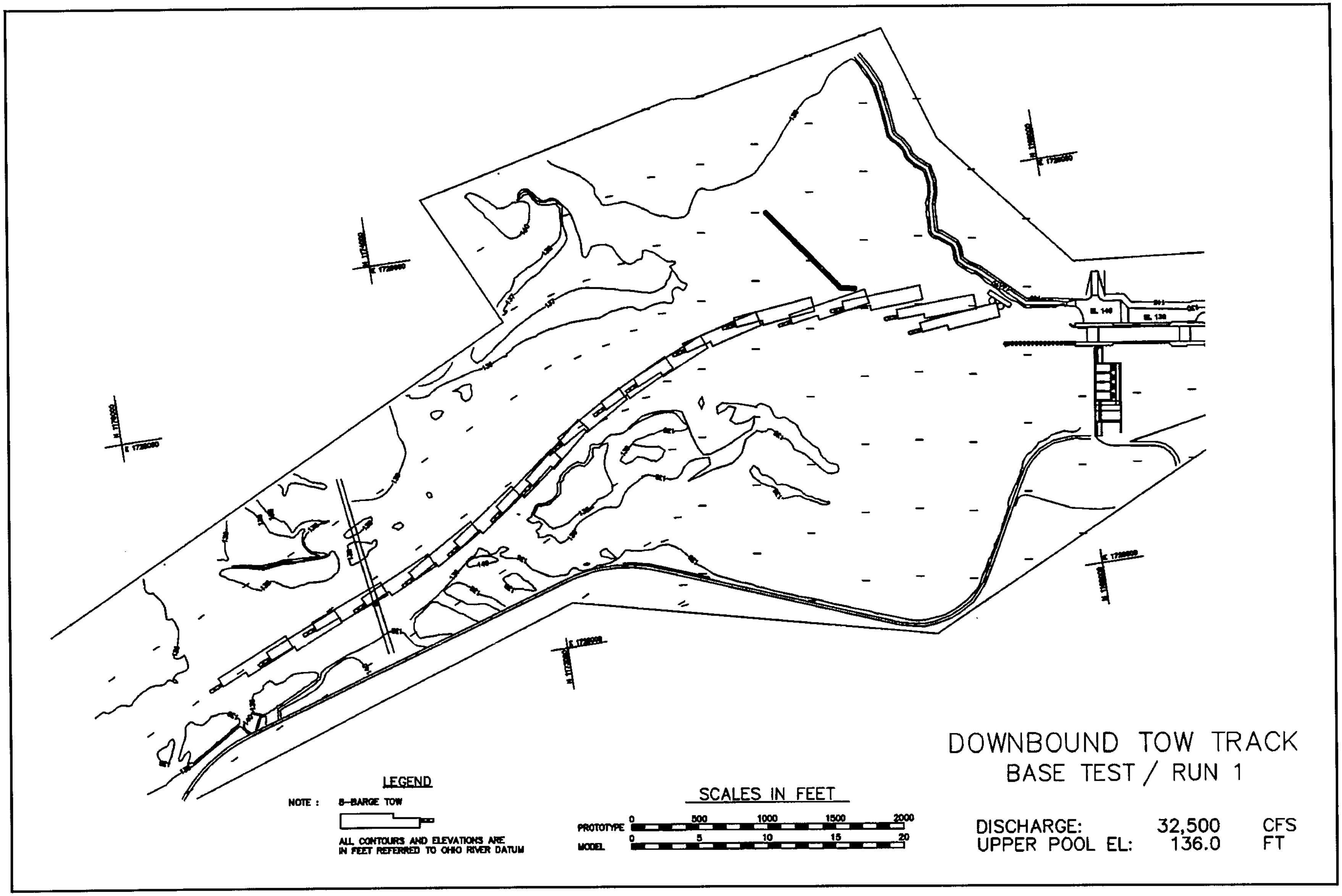
LEGEND

NOTE : 8-BARGE TOW

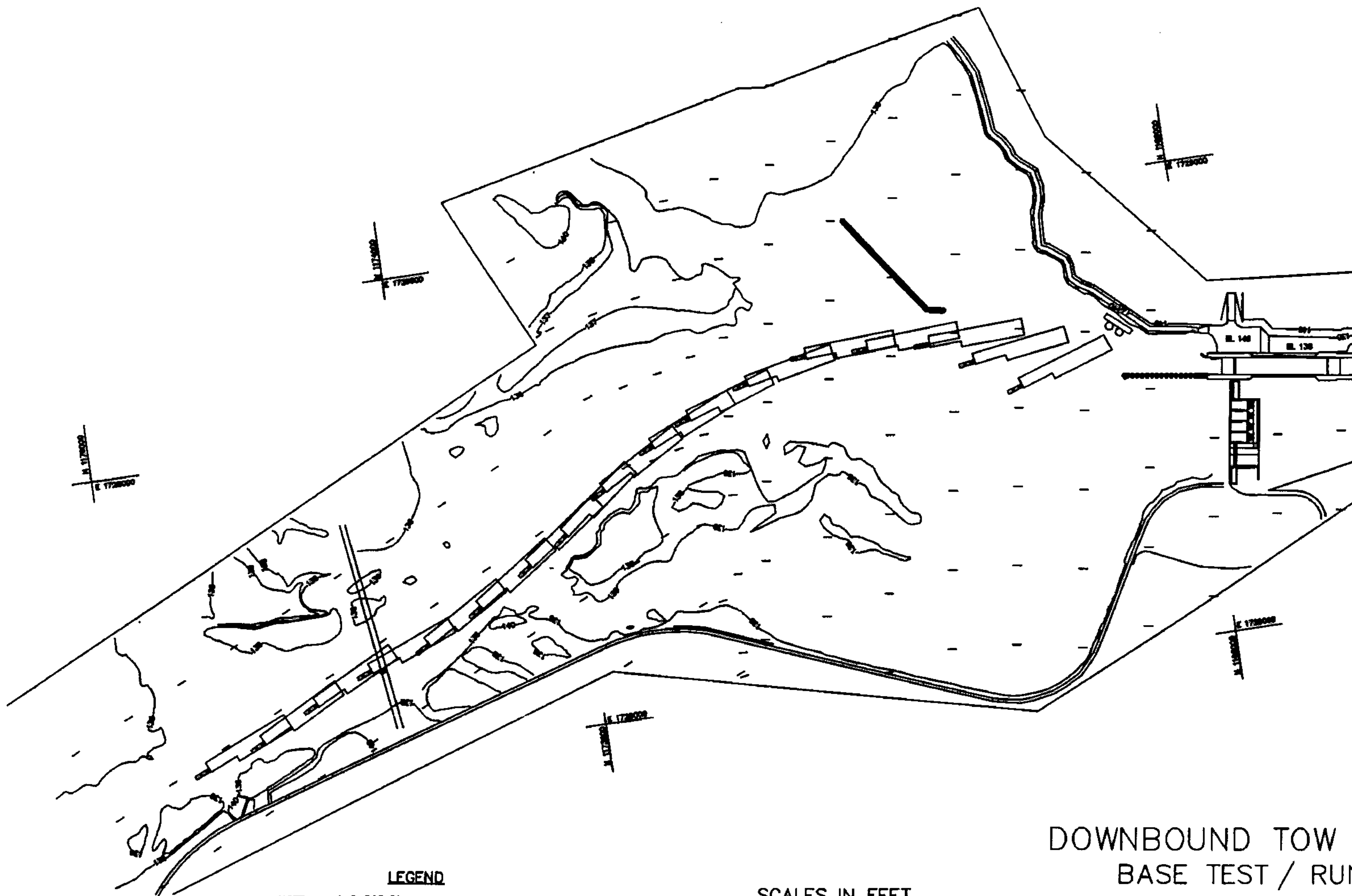
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



DOWNBOUND TOW TRACK
BASE TEST / RUN 1
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



DOWNBOUND TOW TRACK
BASE TEST / RUN 2

LEGEND

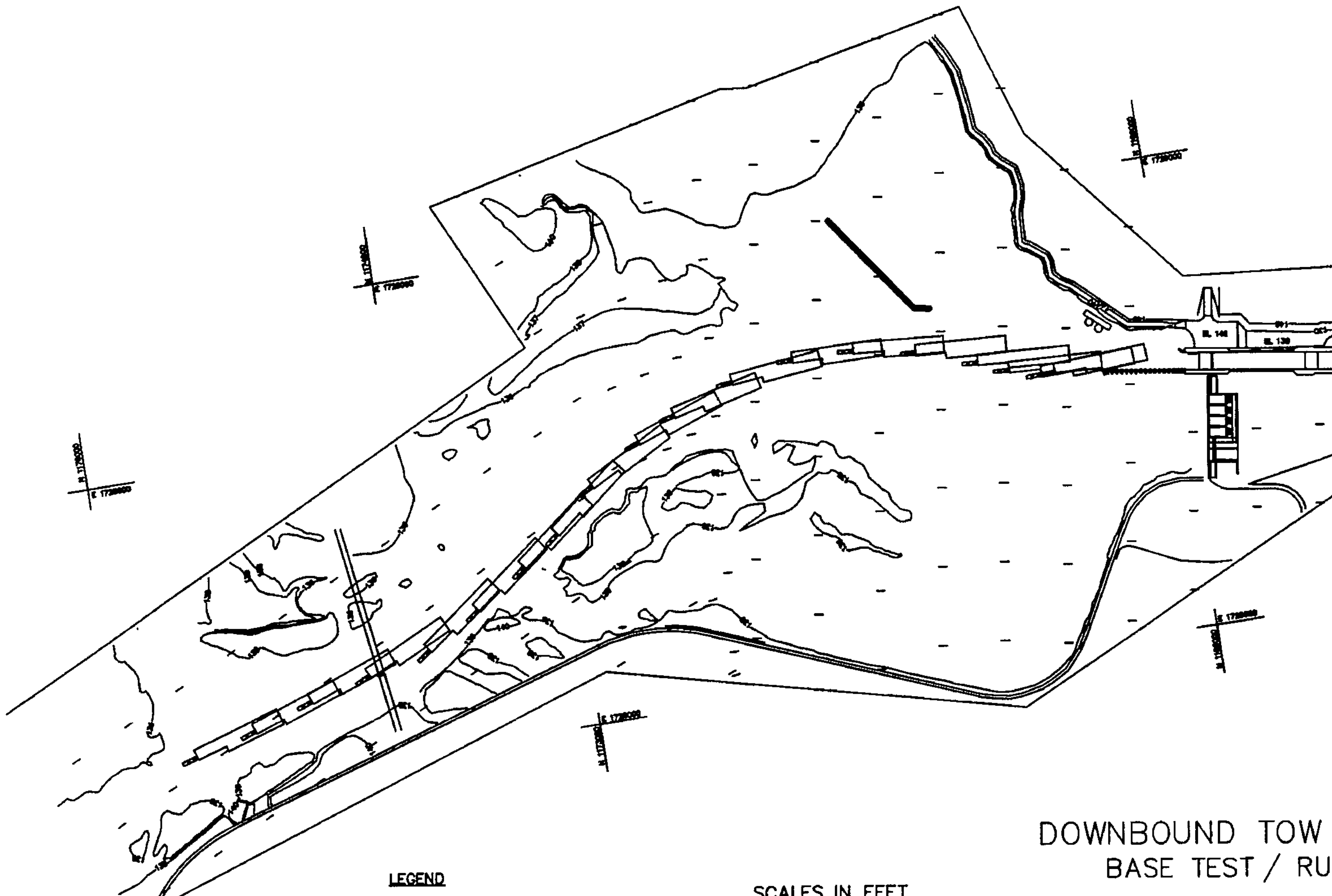
NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT



LEGEND

NOTE : 8-BARGE TOW

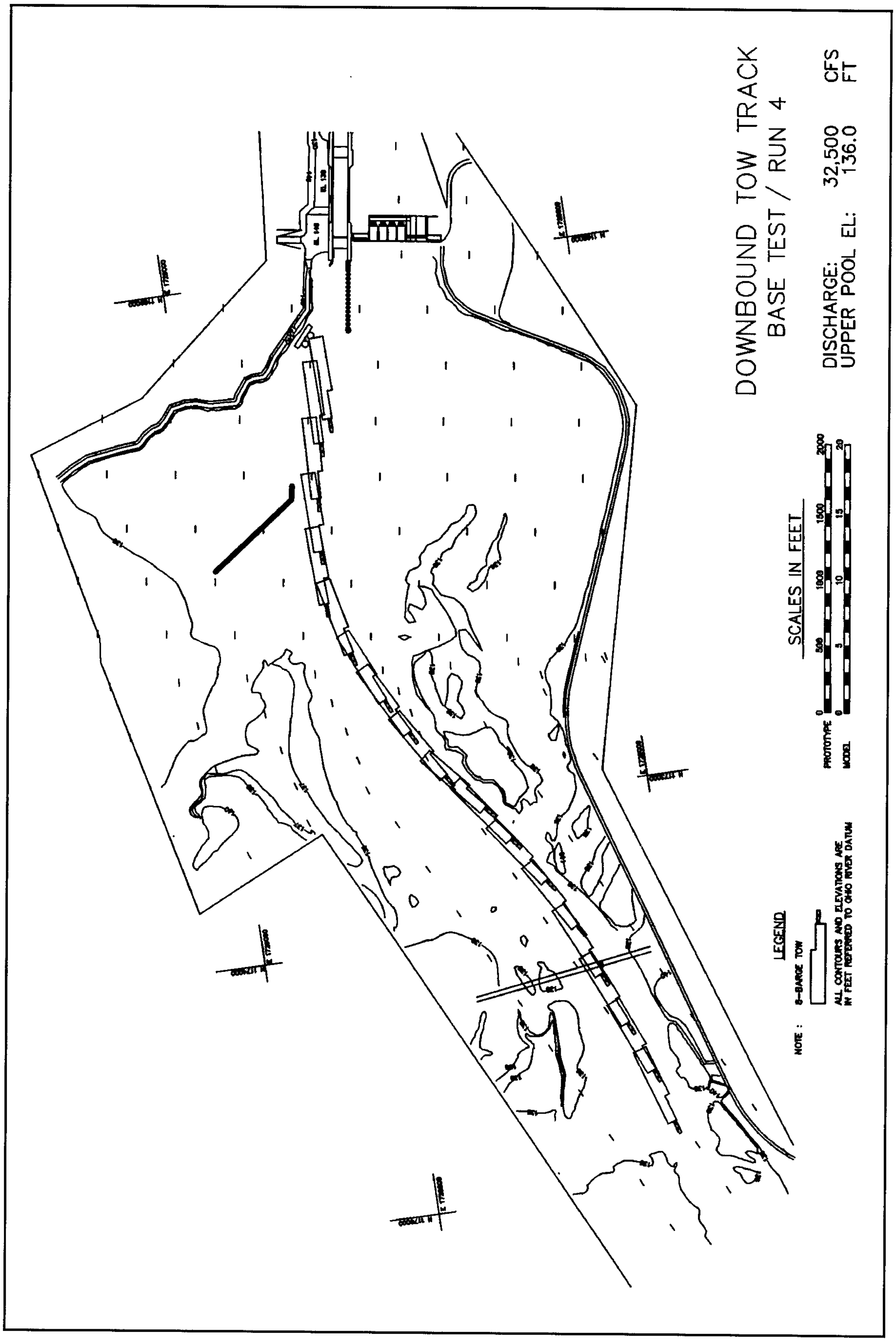
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

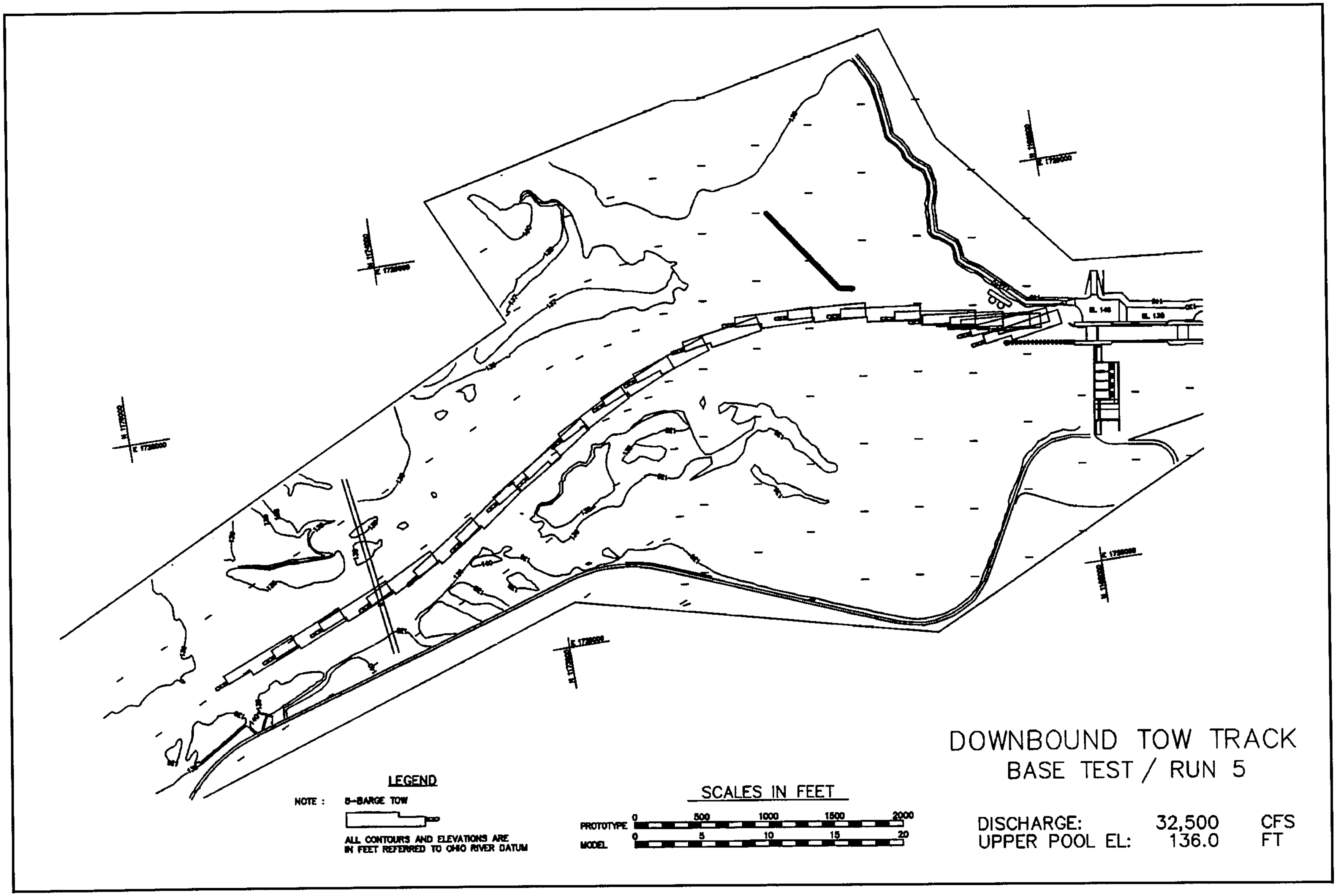
SCALES IN FEET

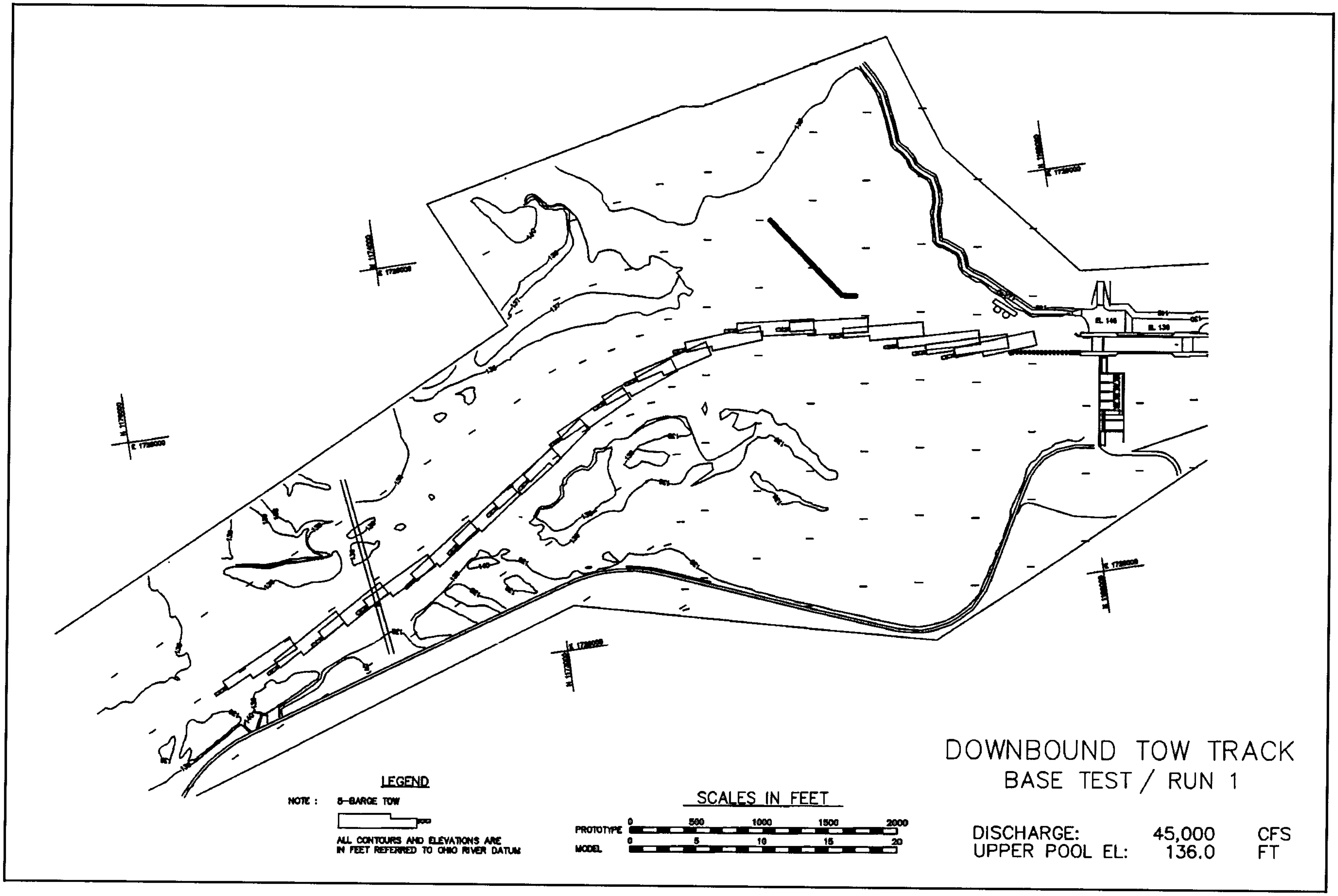
PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20

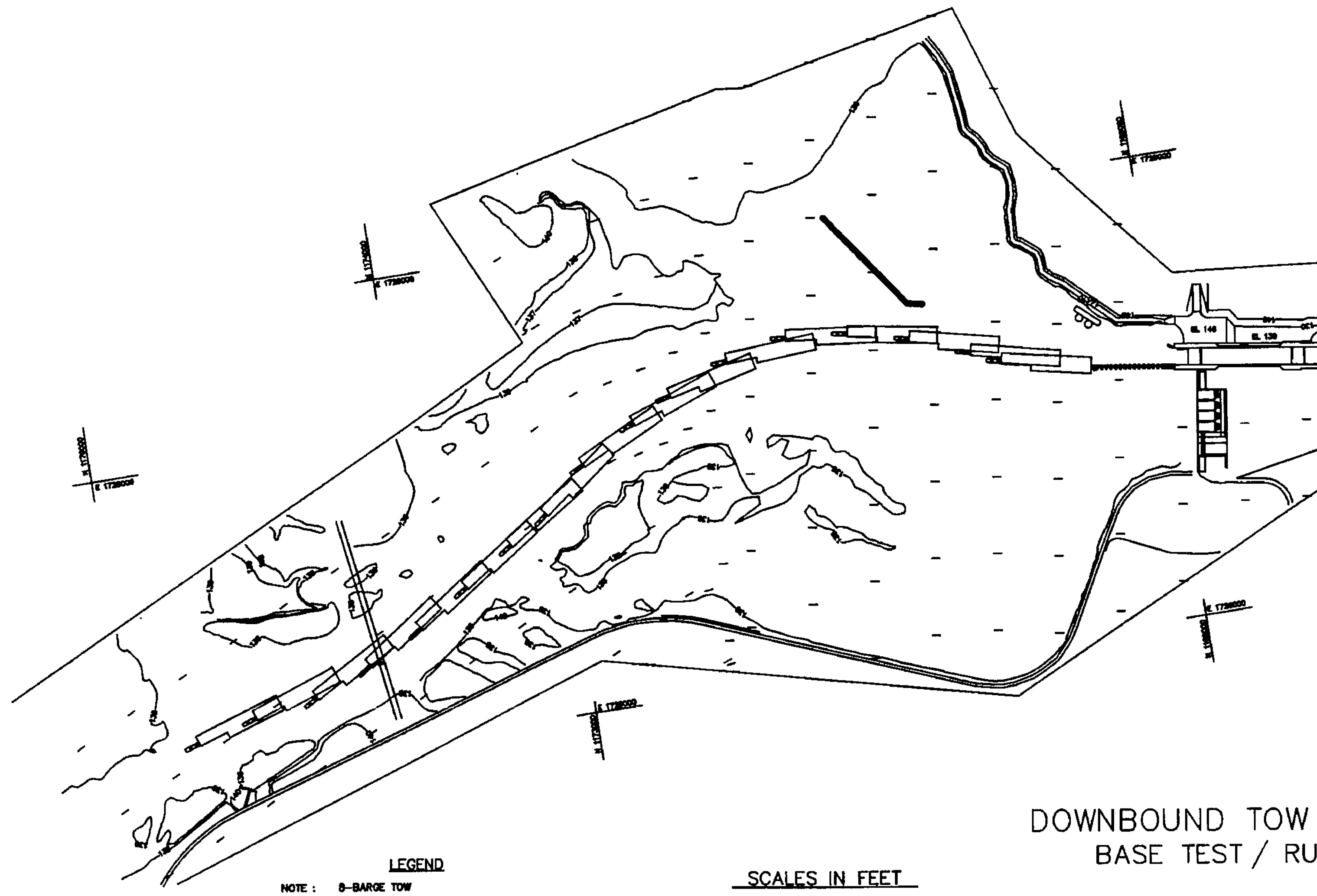
DOWNBOUND TOW TRACK
BASE TEST / RUN 3

DISCHARGE:	32,500	CFS
UPPER POOL EL:	136.0	FT


DOWNBOUND TOW TRACK
BASE TEST / RUN 4
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE : ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
BASE TEST / RUN 5
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE :
5-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
BASE TEST / RUN 1
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

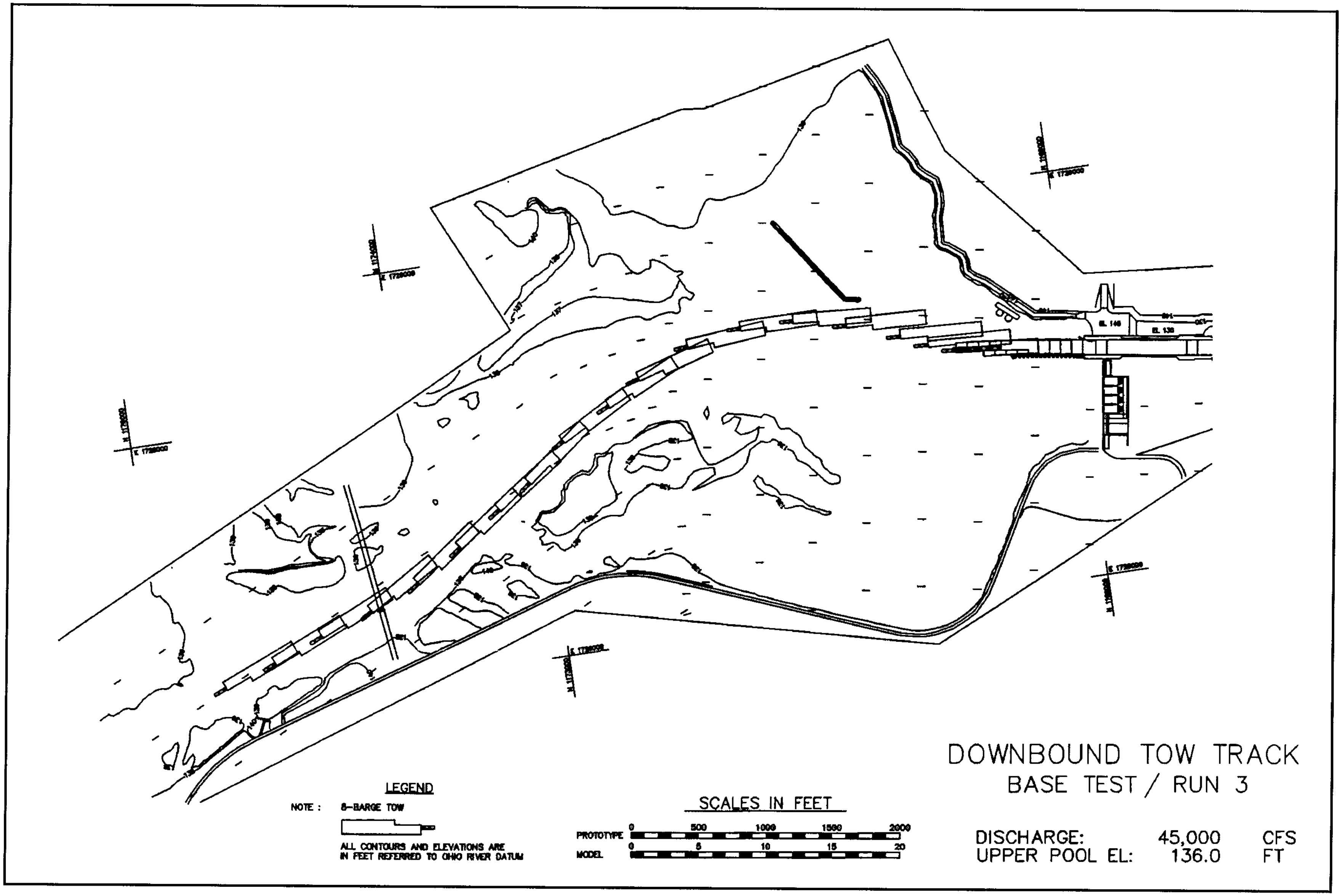
SCALES IN FEET

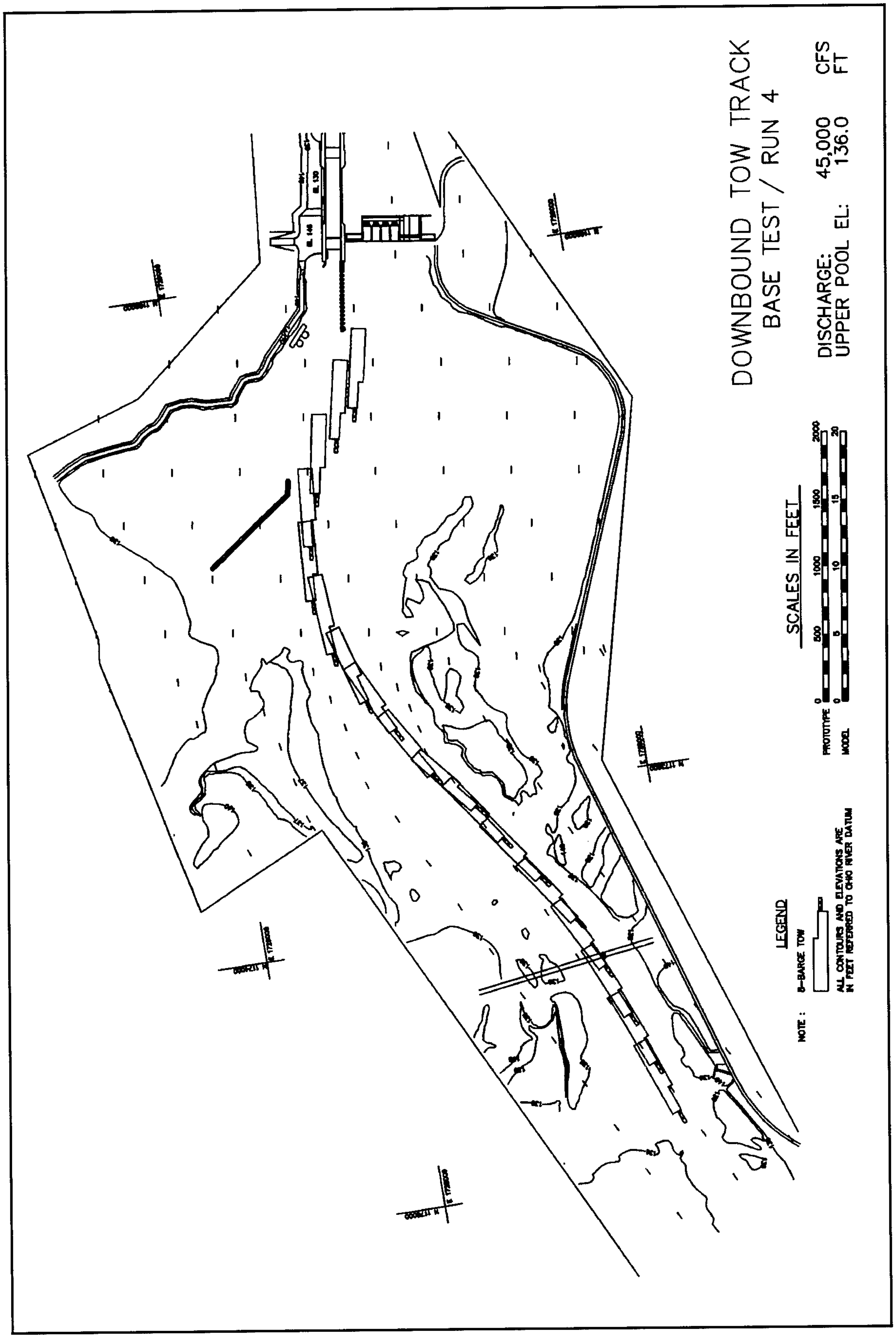
PROTOTYPE 0 500 1000 1500 2000

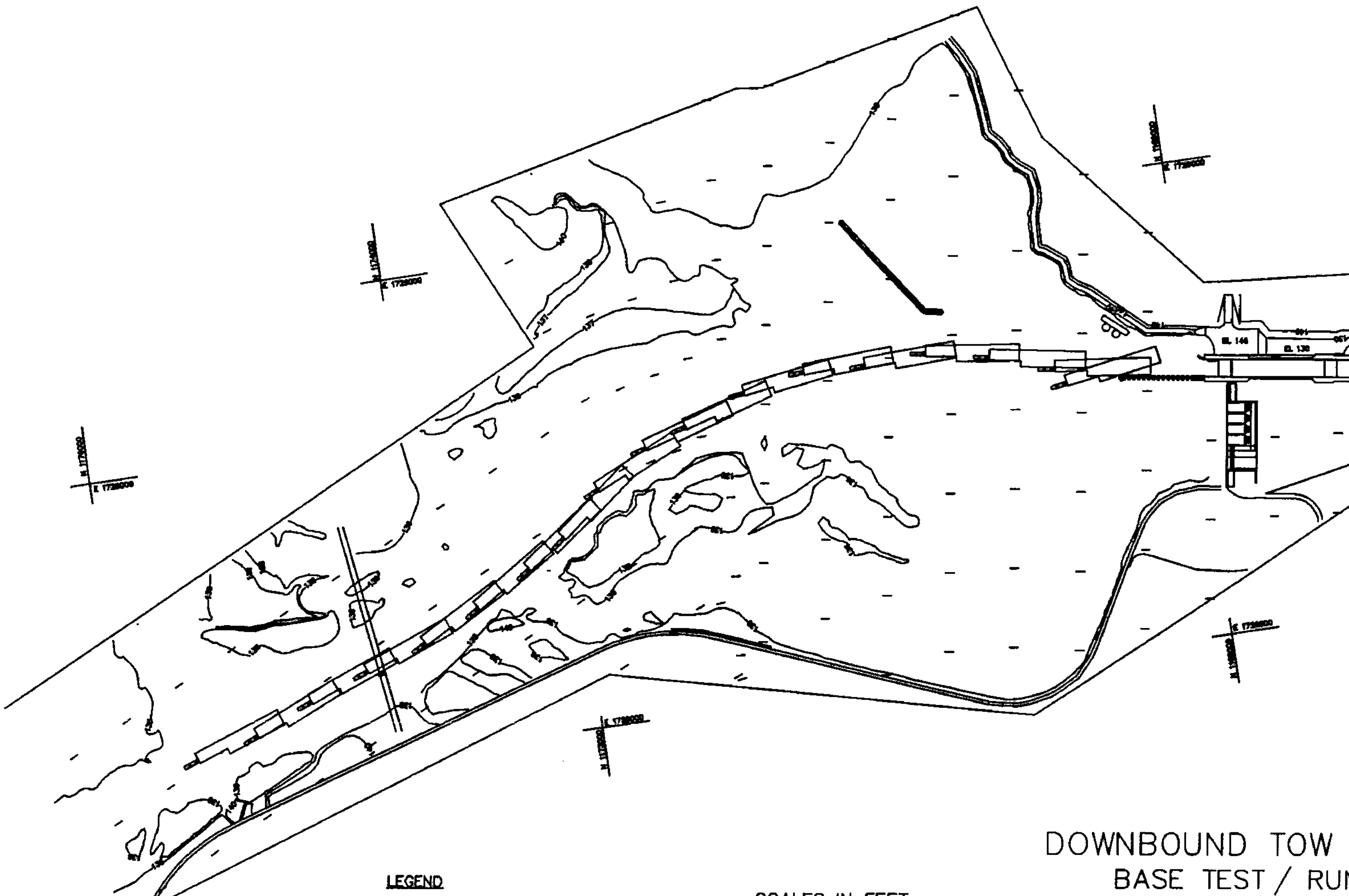
MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
BASE TEST / RUN 2

DISCHARGE:	45,000	CFS
UPPER POOL EL:	136.0	FT


DOWNBOUND TOW TRACK
BASE TEST / RUN 3
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 146
EL 130


DOWNBOUND TOW TRACK
BASE TEST / RUN 4
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

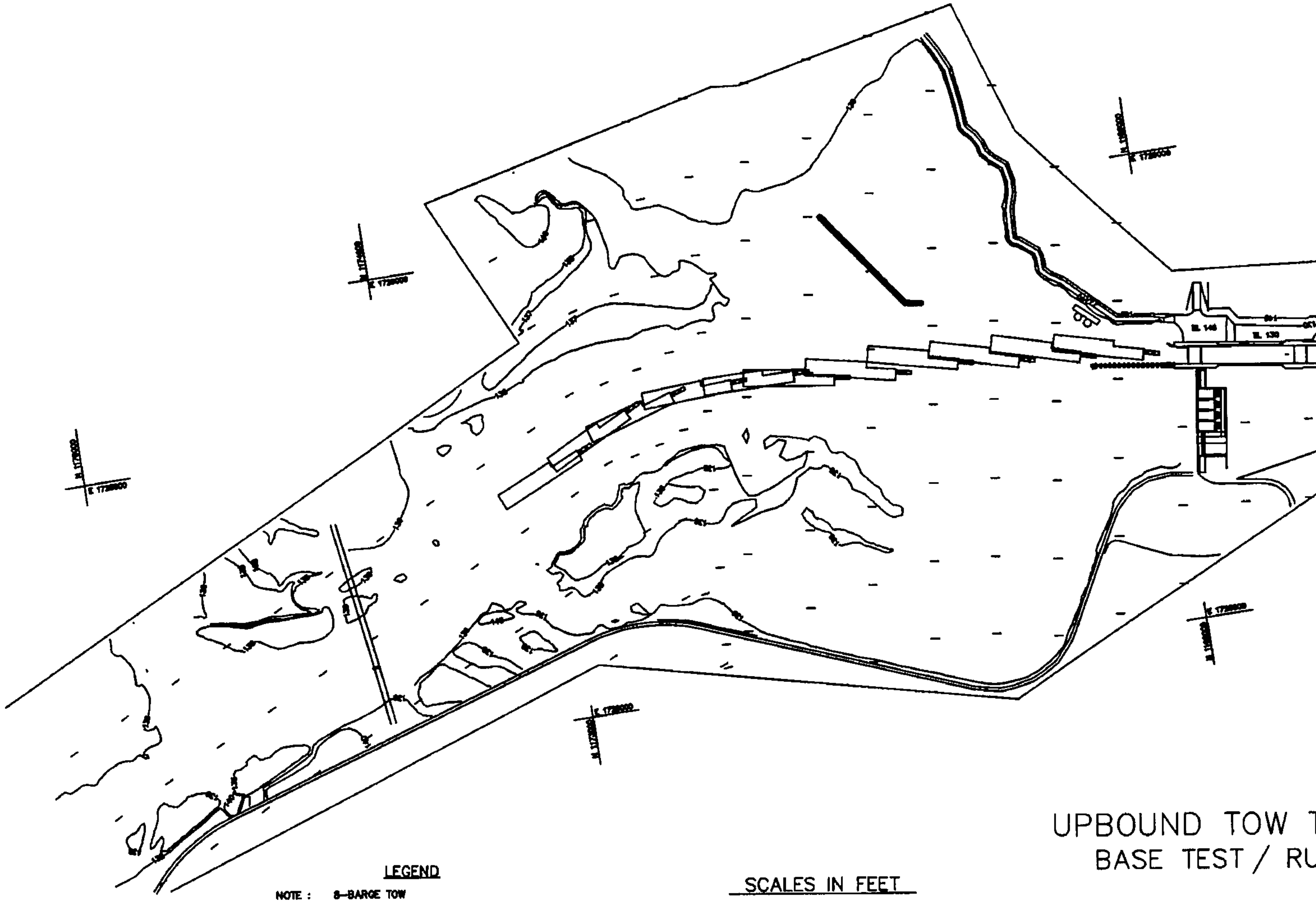
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
BASE TEST / RUN 5

DISCHARGE:	45,000	CFS
UPPER POOL EL:	136.0	FT



LEGEND

NOTE : 8–BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

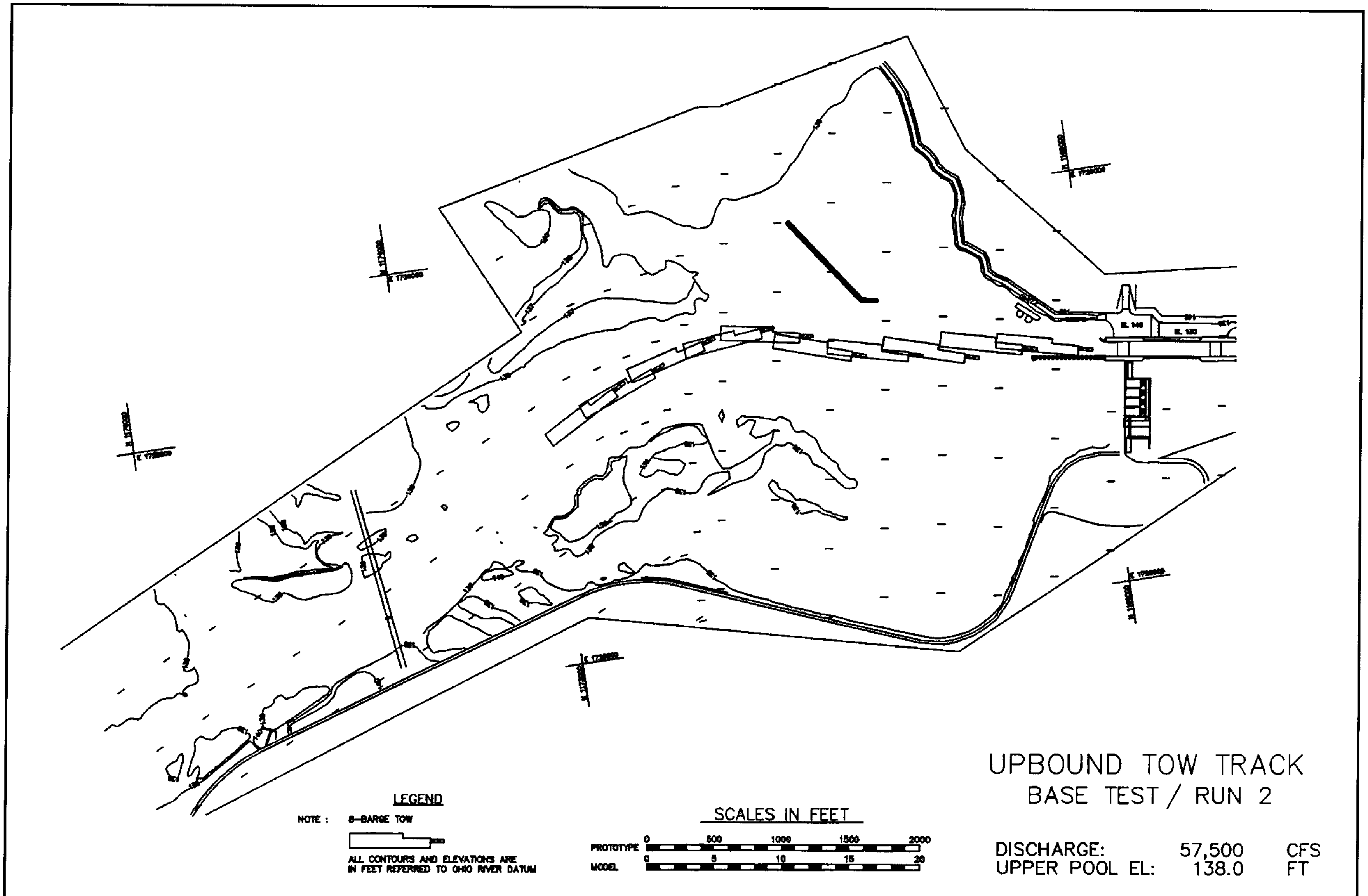
MODEL 0 5 10 15 20

UPBOUND TOW TRACK

BASE TEST / RUN 1

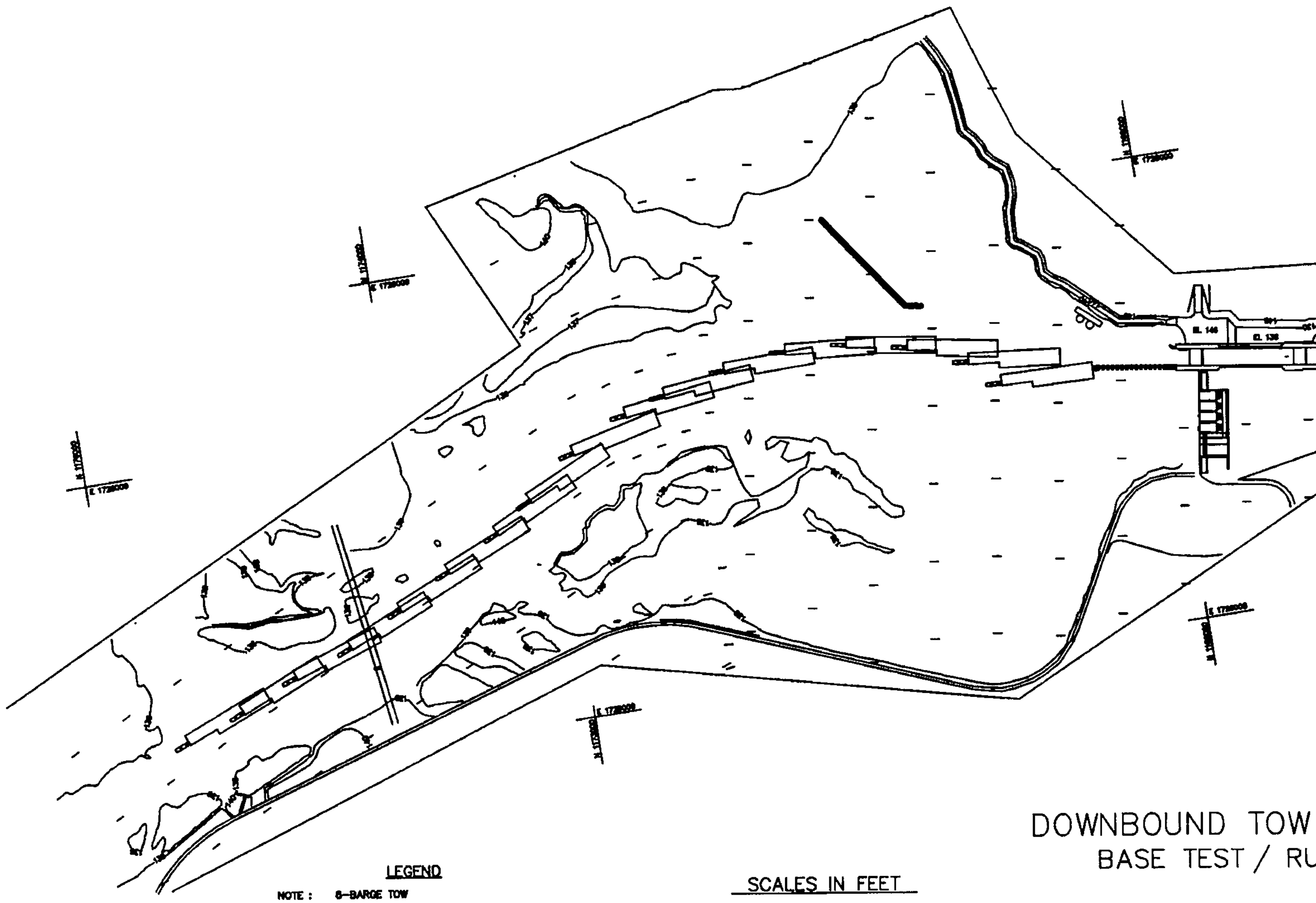
DISCHARGE: 57,500 CFS

UPPER POOL EL: 138.0 FT



UPBOUND TOW TRACK
BASE TEST / RUN 2

DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT



DOWNBOUND TOW TRACK
BASE TEST / RUN 1

DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT

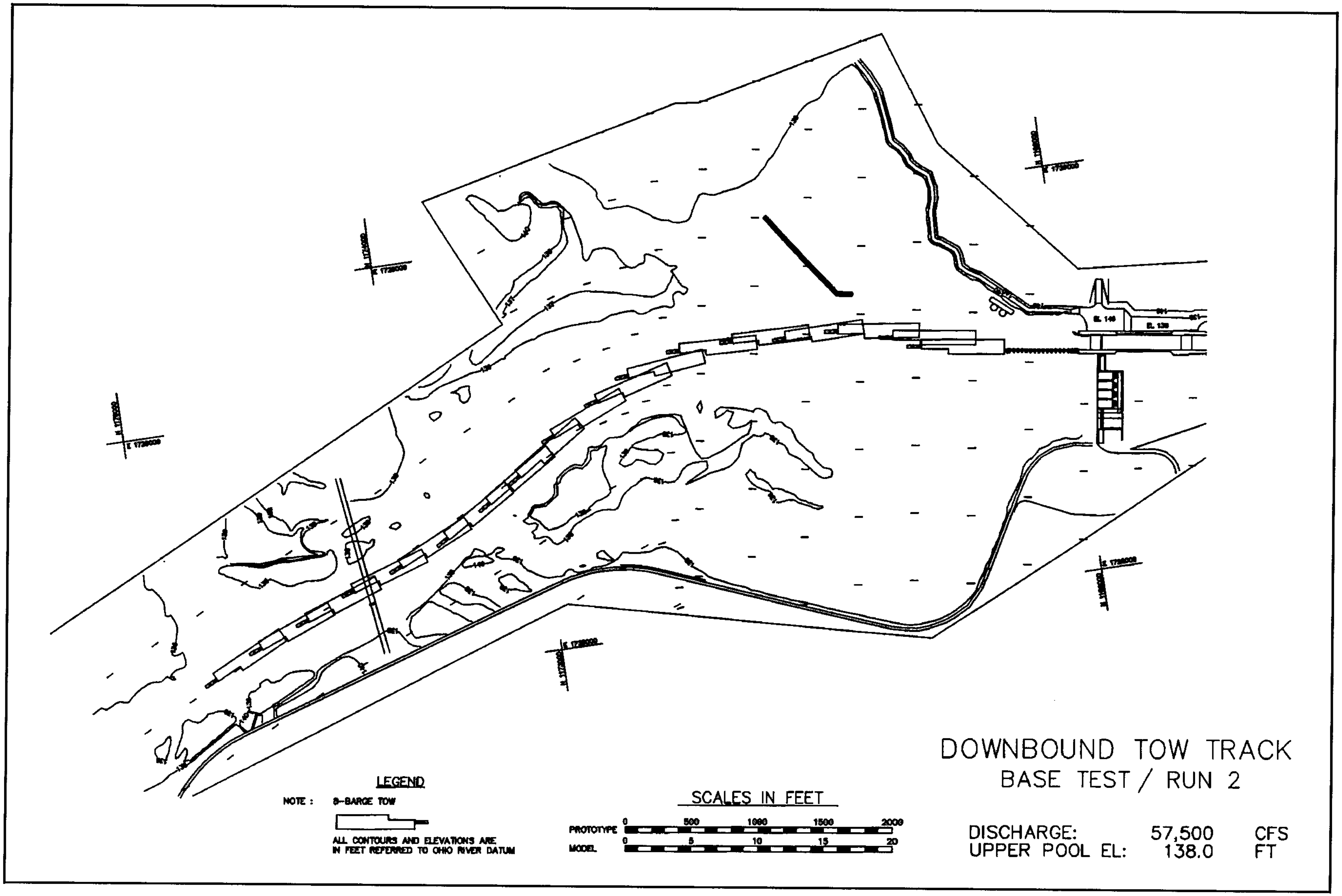
LEGEND

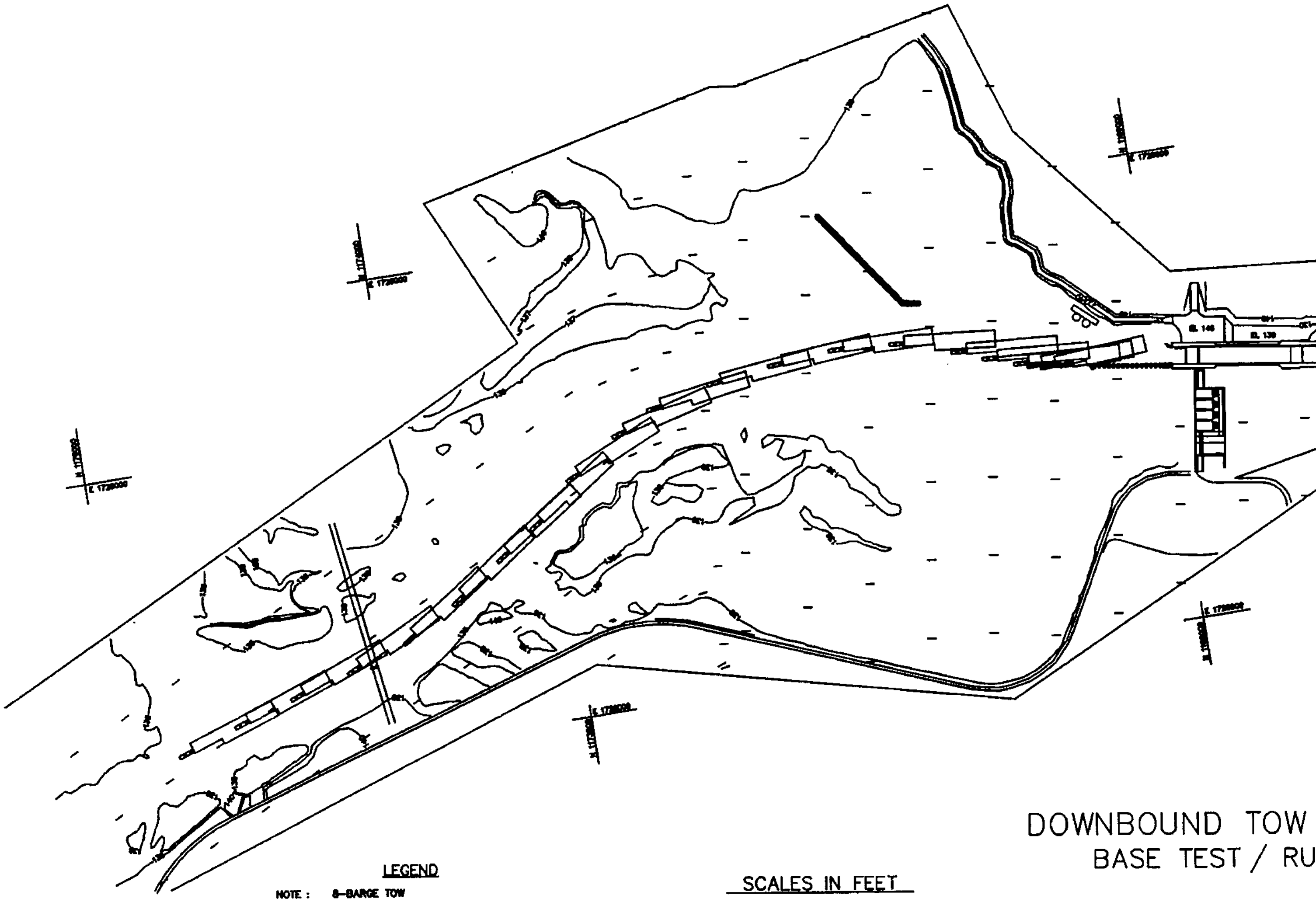
NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
BASE TEST / RUN 2
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
EL 146
EL 138



DOWNBOUND TOW TRACK
BASE TEST / RUN 3

DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT

LEGEND

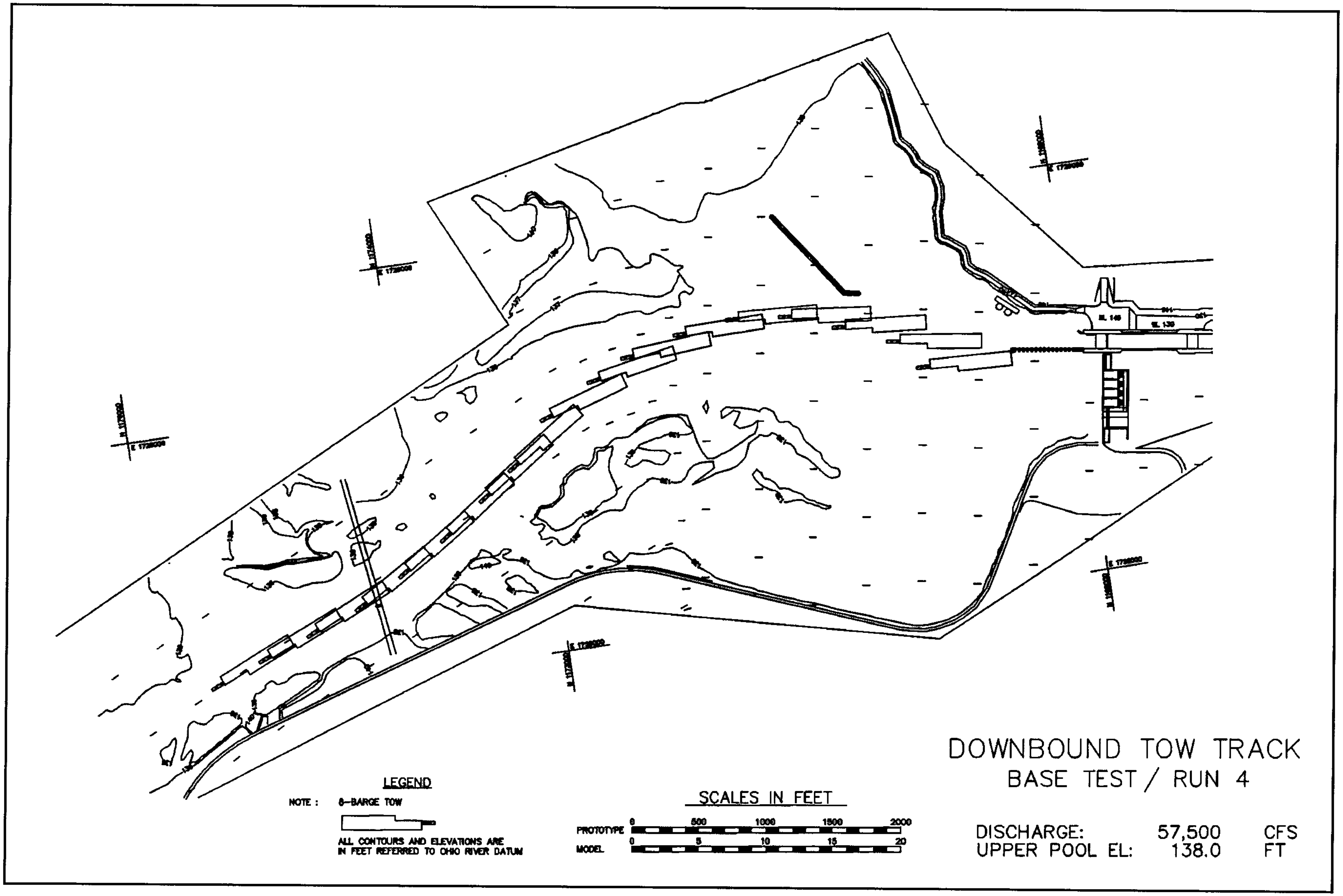
NOTE : 8-BARGE TOW

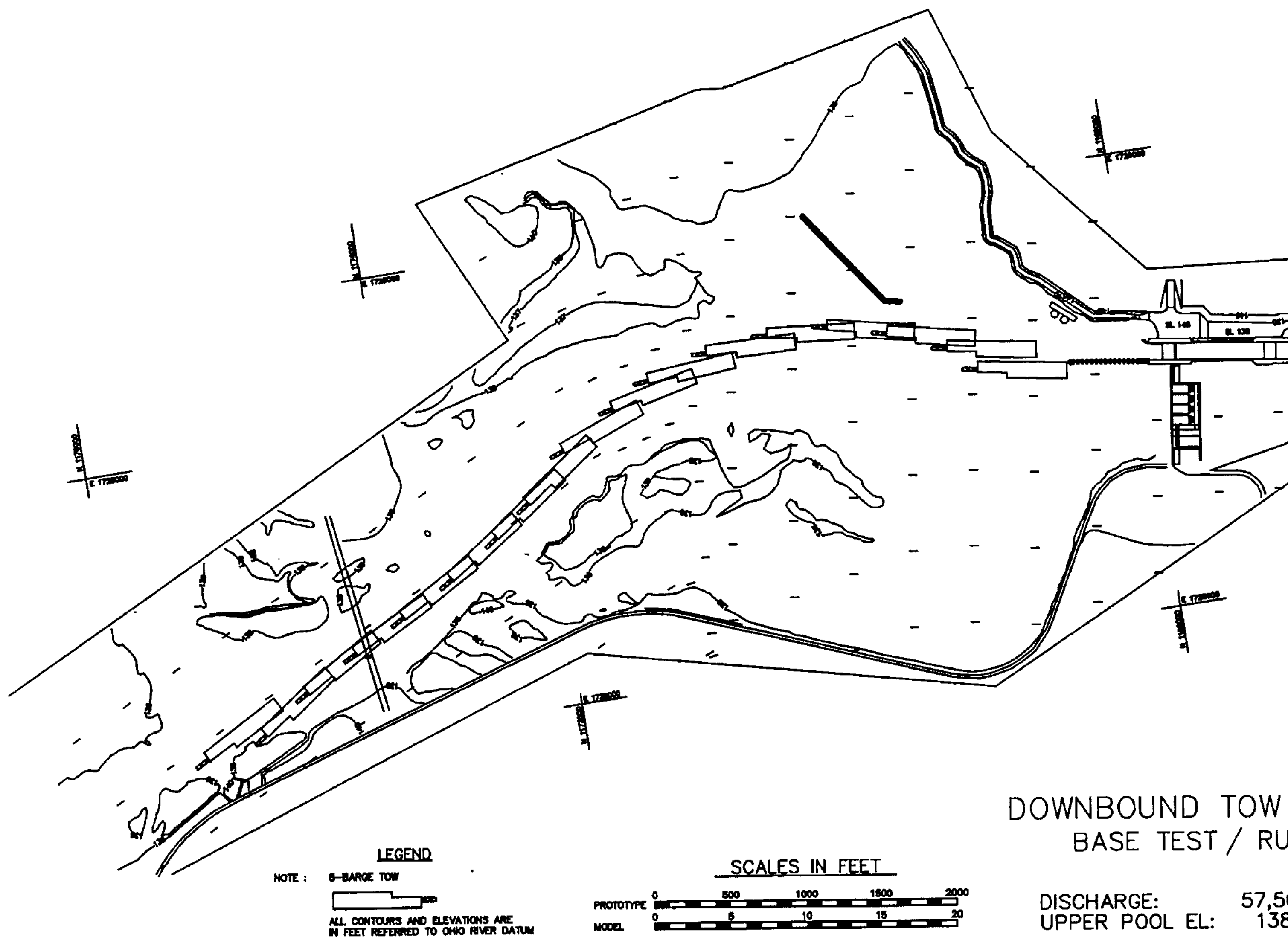
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

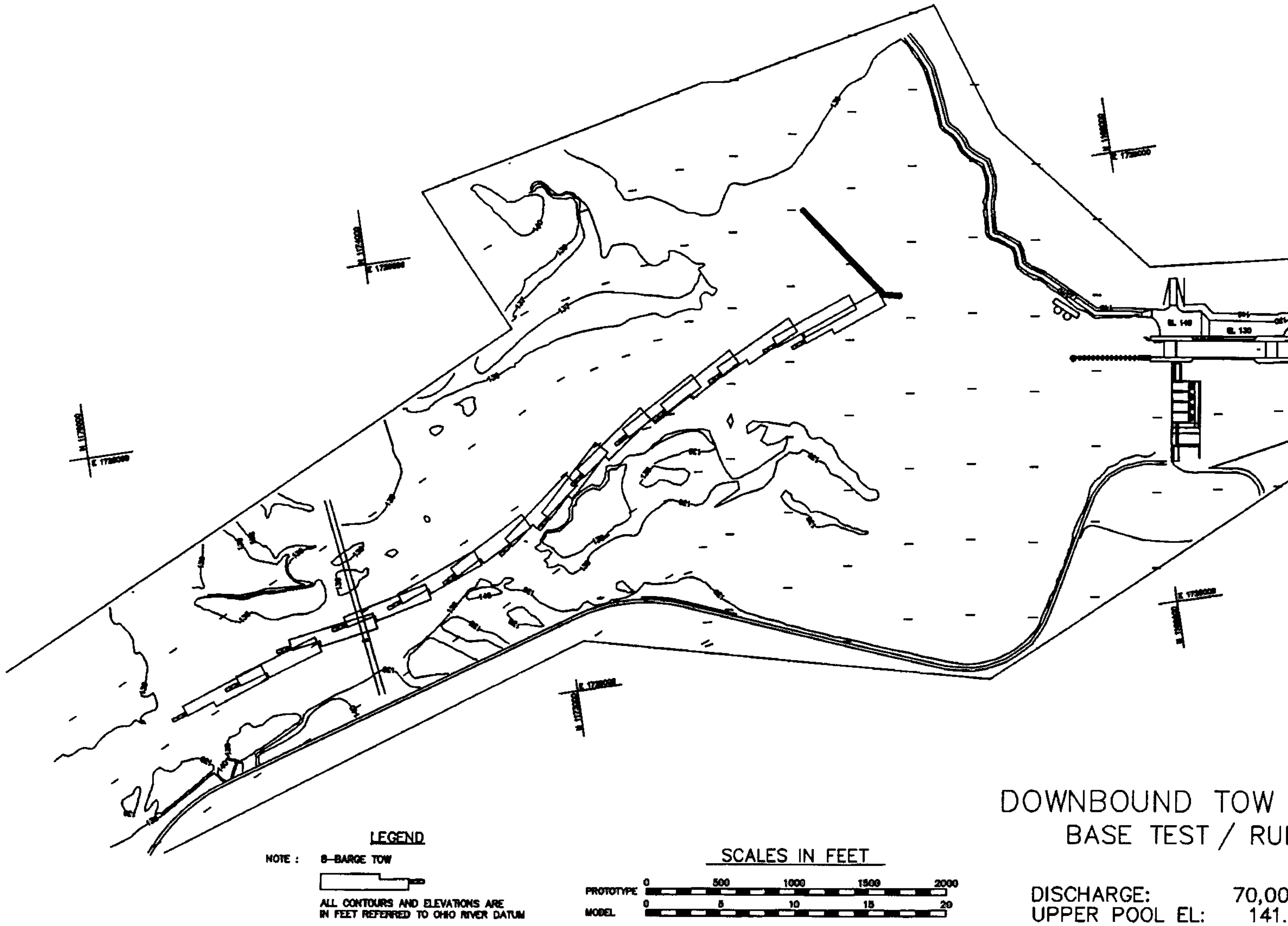
MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
BASE TEST / RUN 4
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



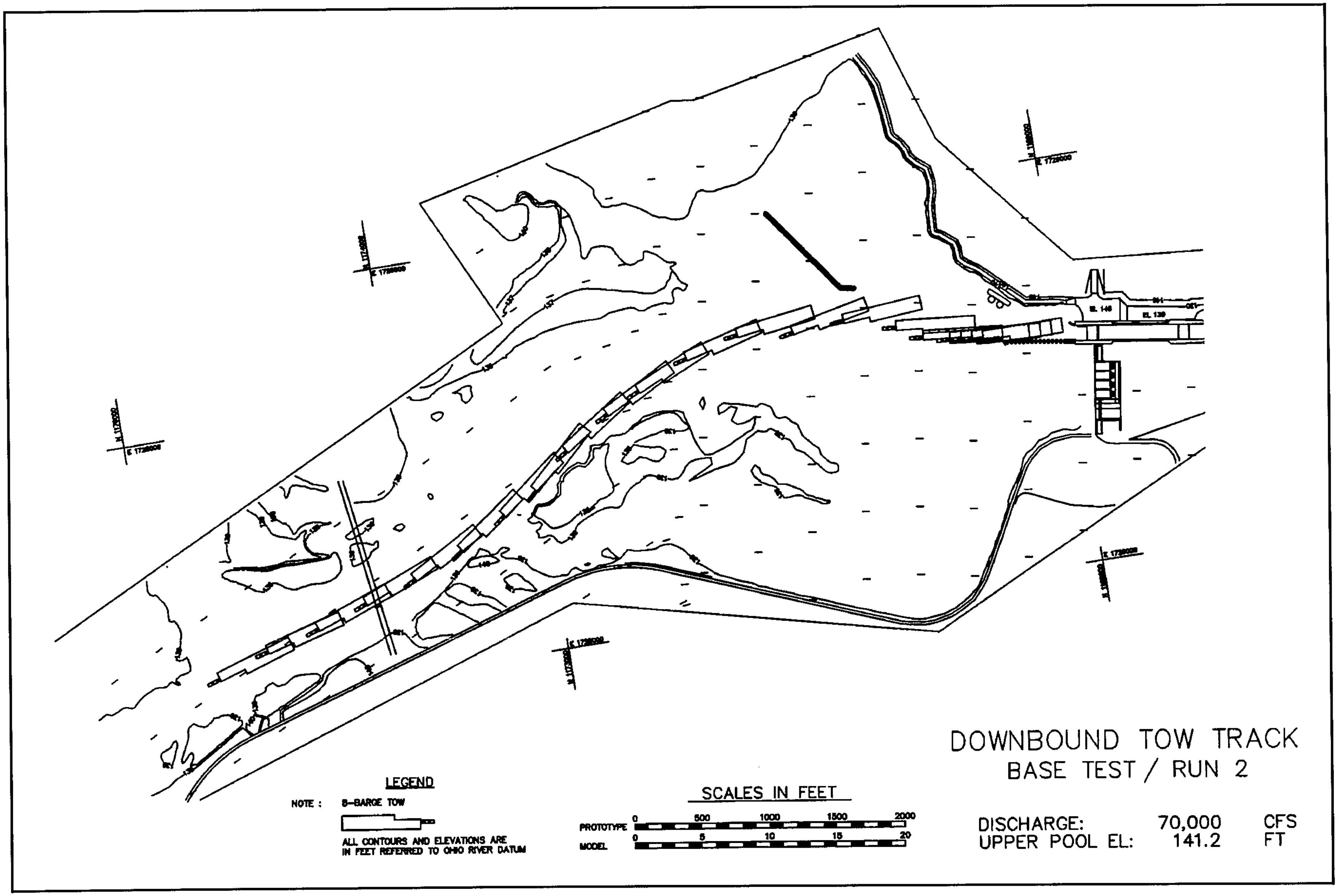
DOWNBOUND TOW TRACK
BASE TEST / RUN 5

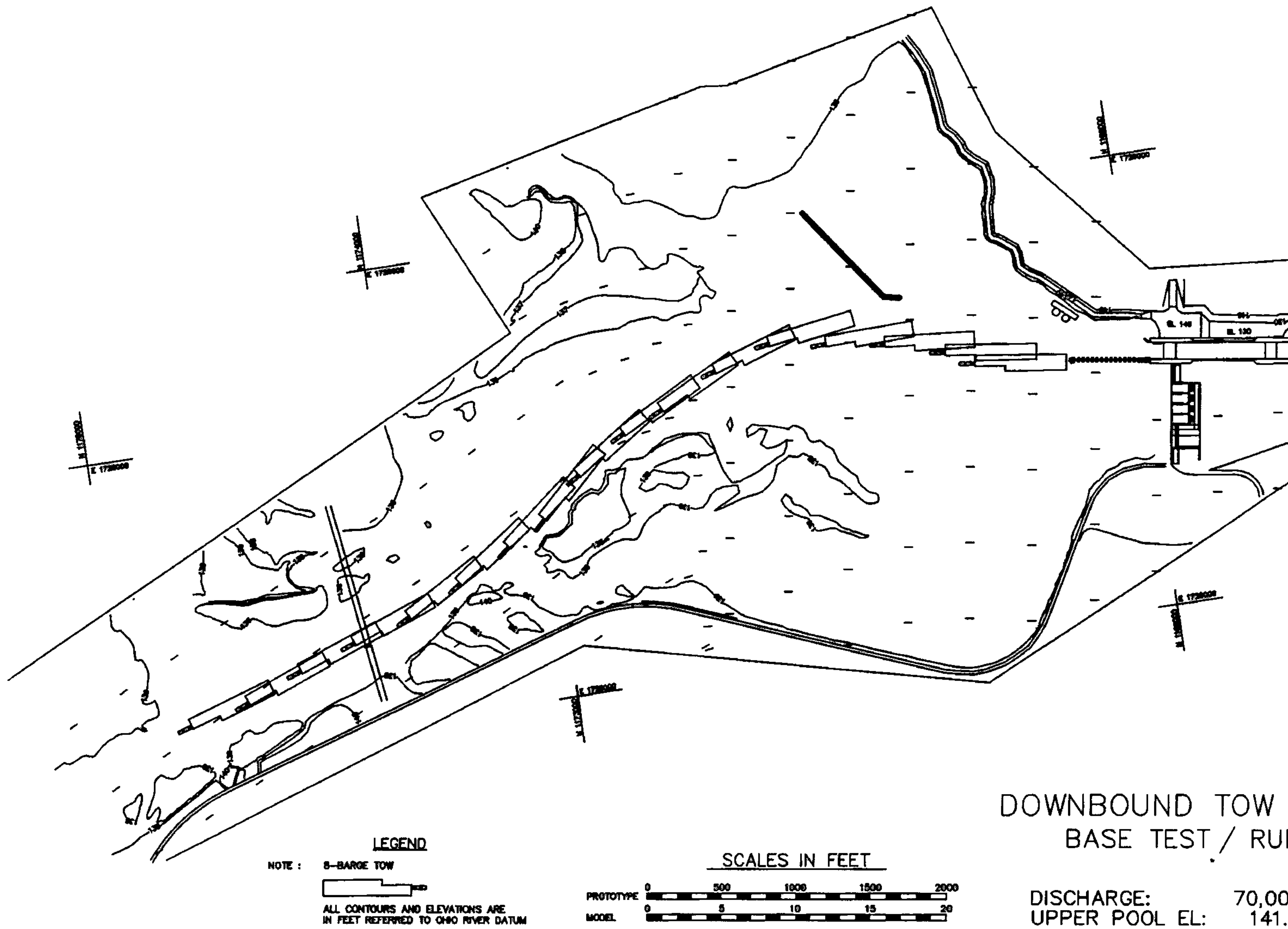
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT



DOWNBOUND TOW TRACK
BASE TEST / RUN 1

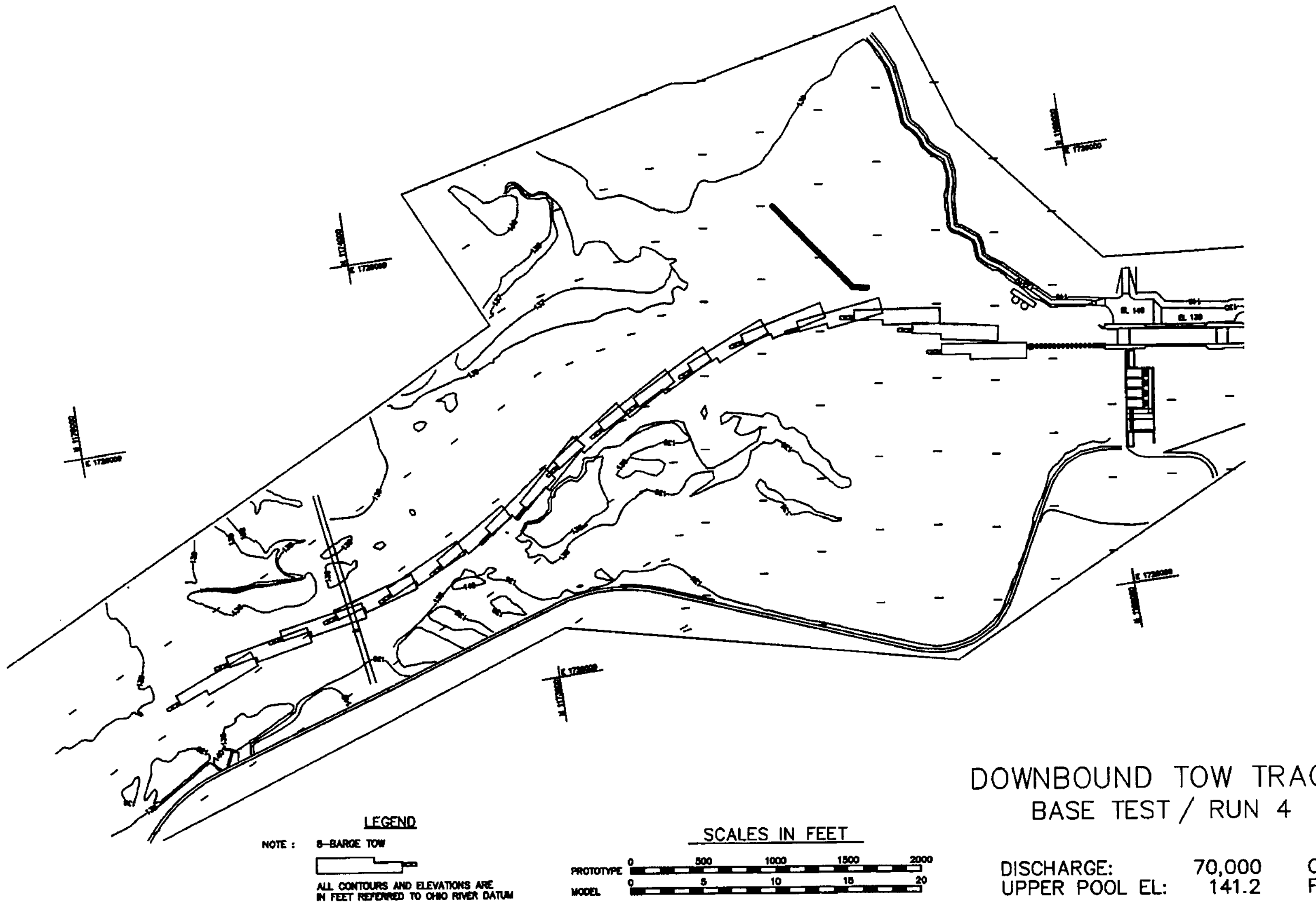
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT


DOWNBOUND TOW TRACK
BASE TEST / RUN 2
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
EL 146
EL 139



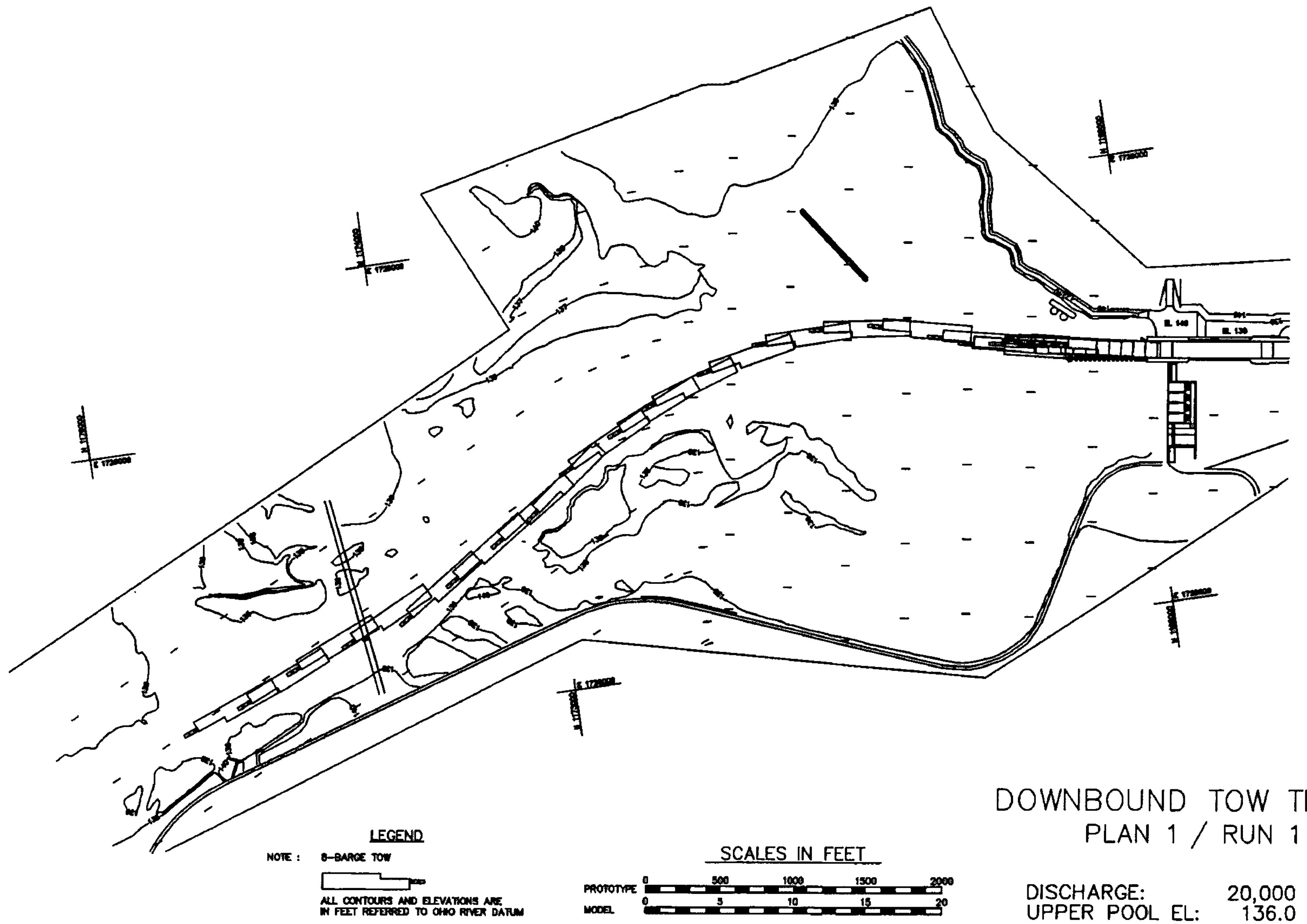
DOWNBOUND TOW TRACK
BASE TEST / RUN 3

DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT



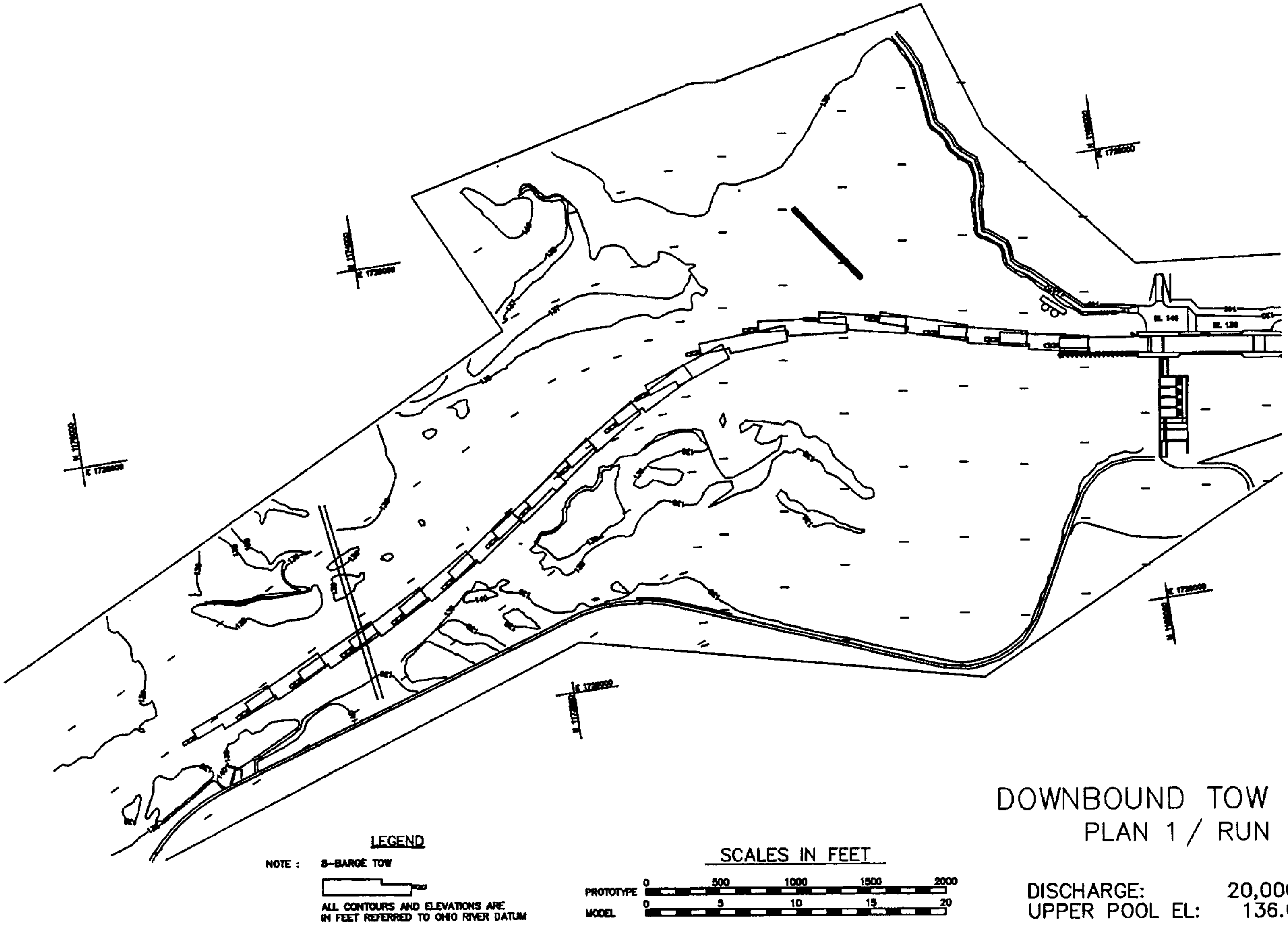
DOWNBOUND TOW TRACK
BASE TEST / RUN 4

DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT



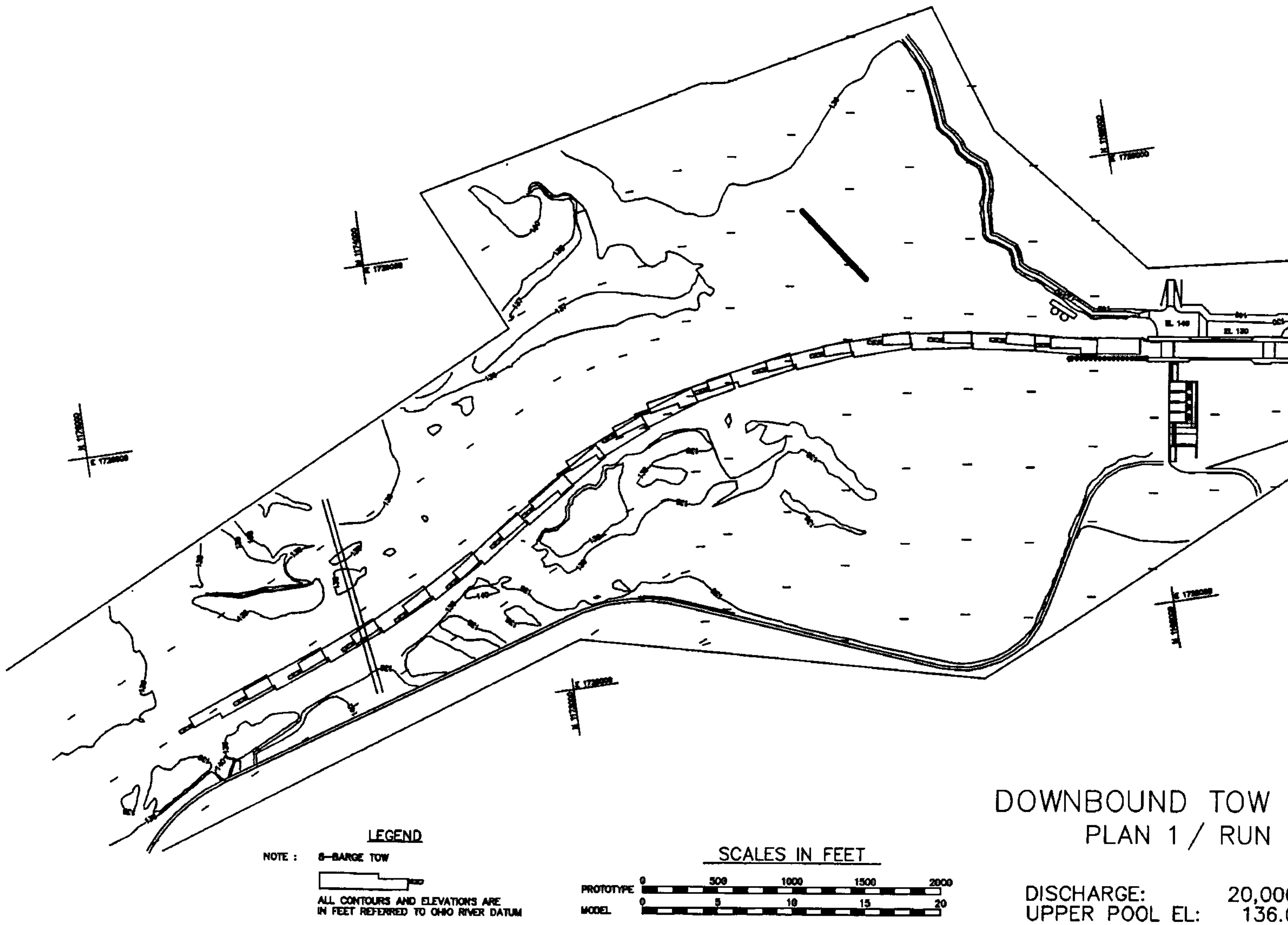
DOWNBOUND TOW TRACK
PLAN 1 / RUN 1

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT



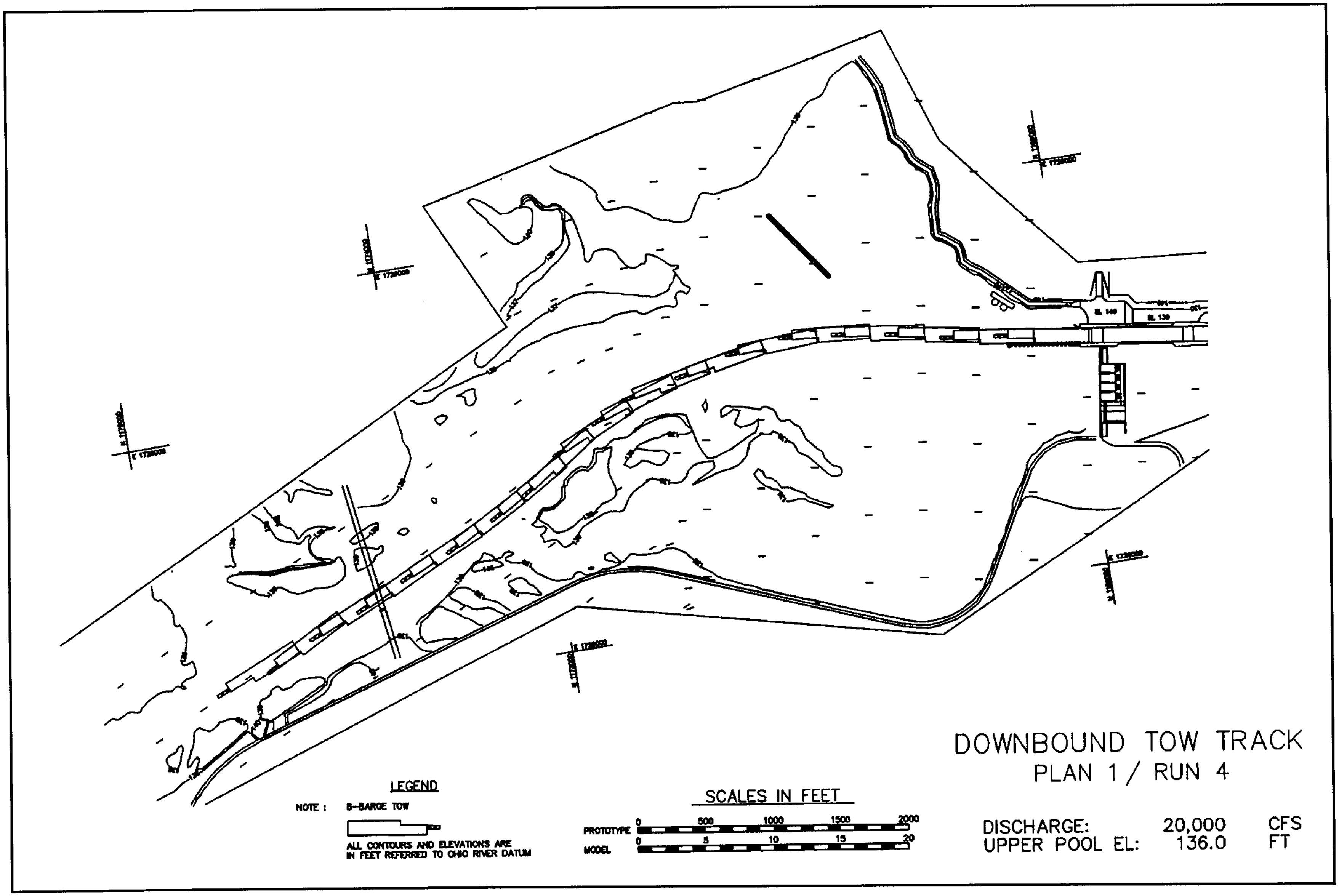
DOWNBOUND TOW TRACK
PLAN 1 / RUN 2

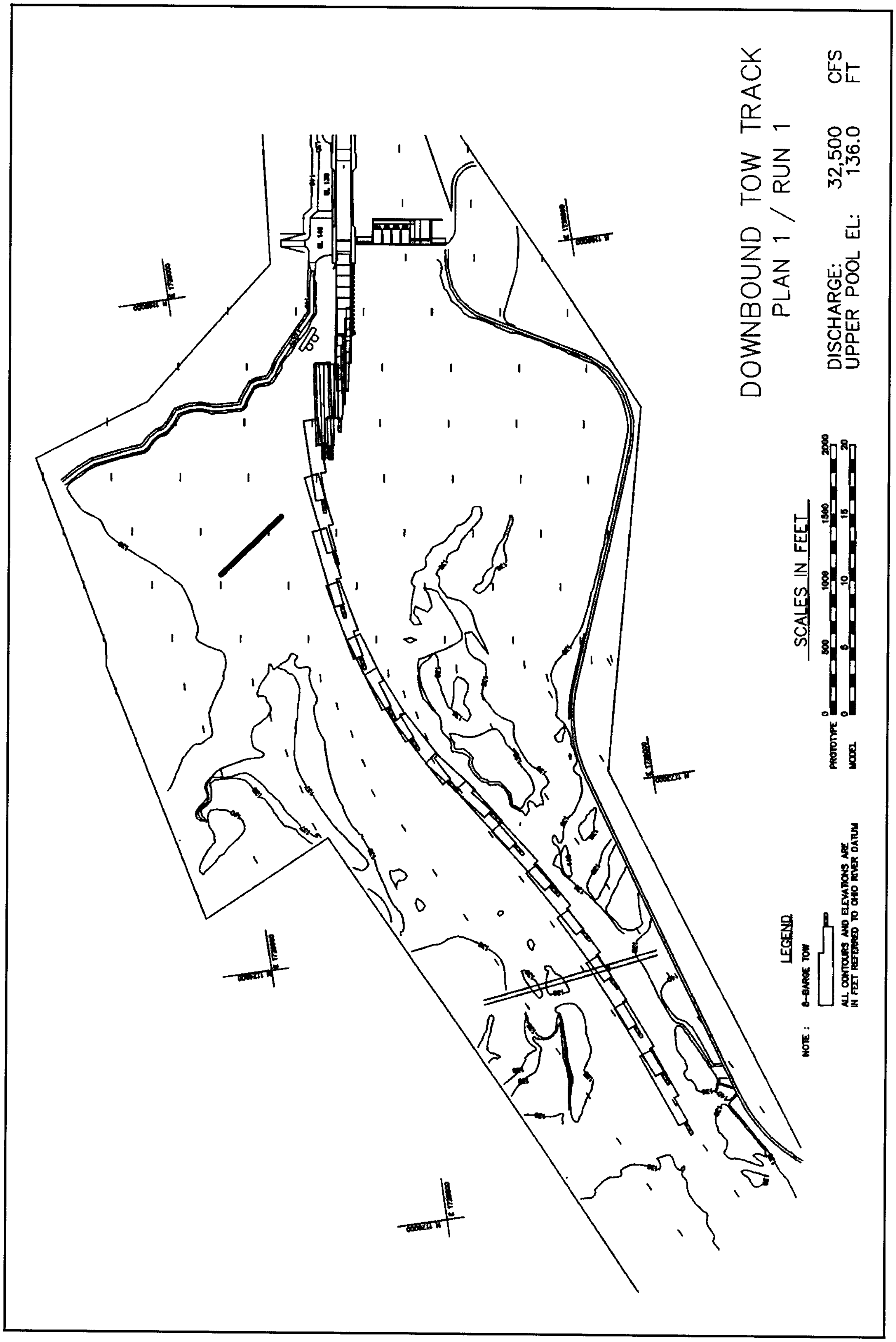
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT

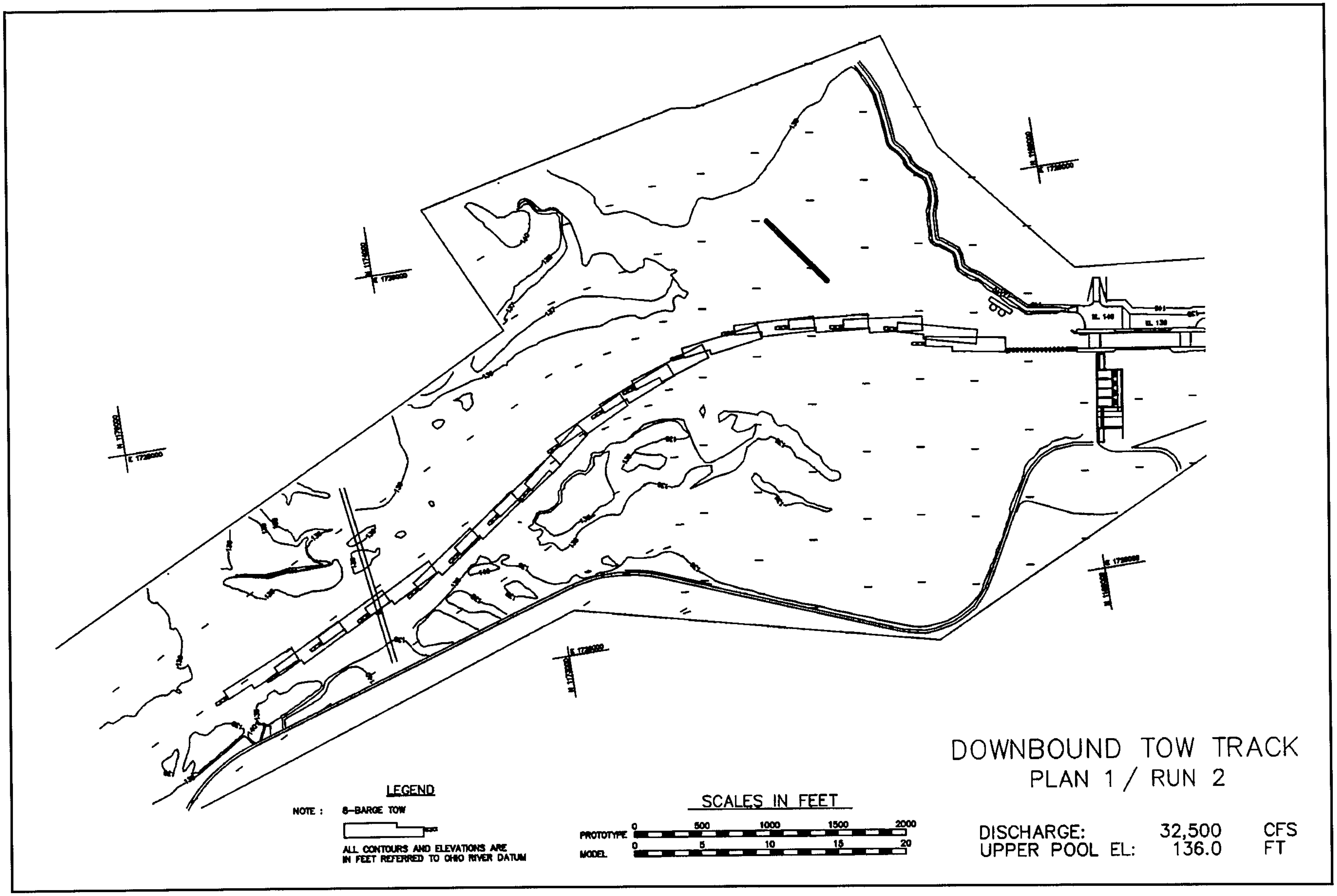


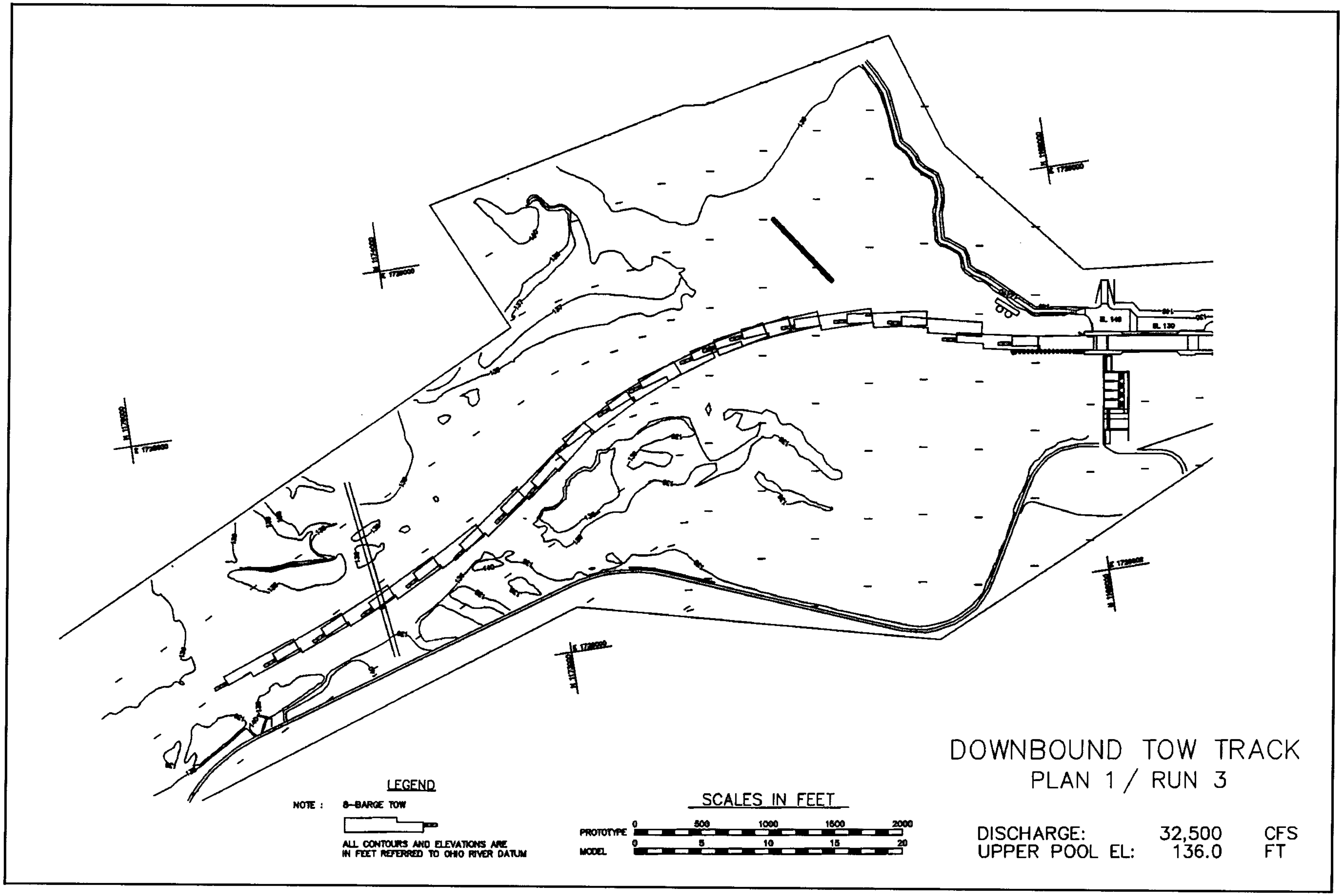
DOWNBOUND TOW TRACK
PLAN 1 / RUN 3

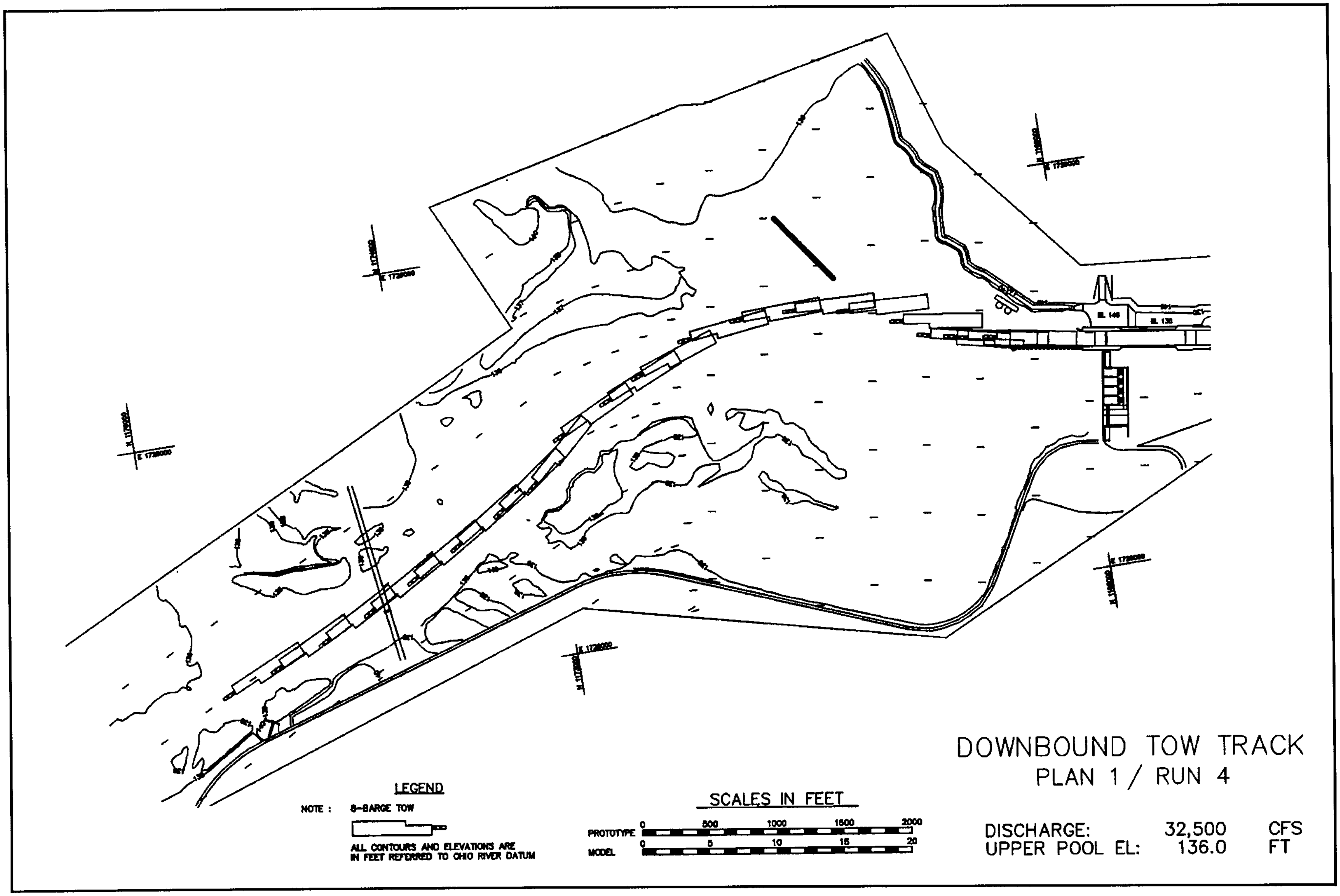
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT


DOWNBOUND TOW TRACK
PLAN 1 / RUN 4
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

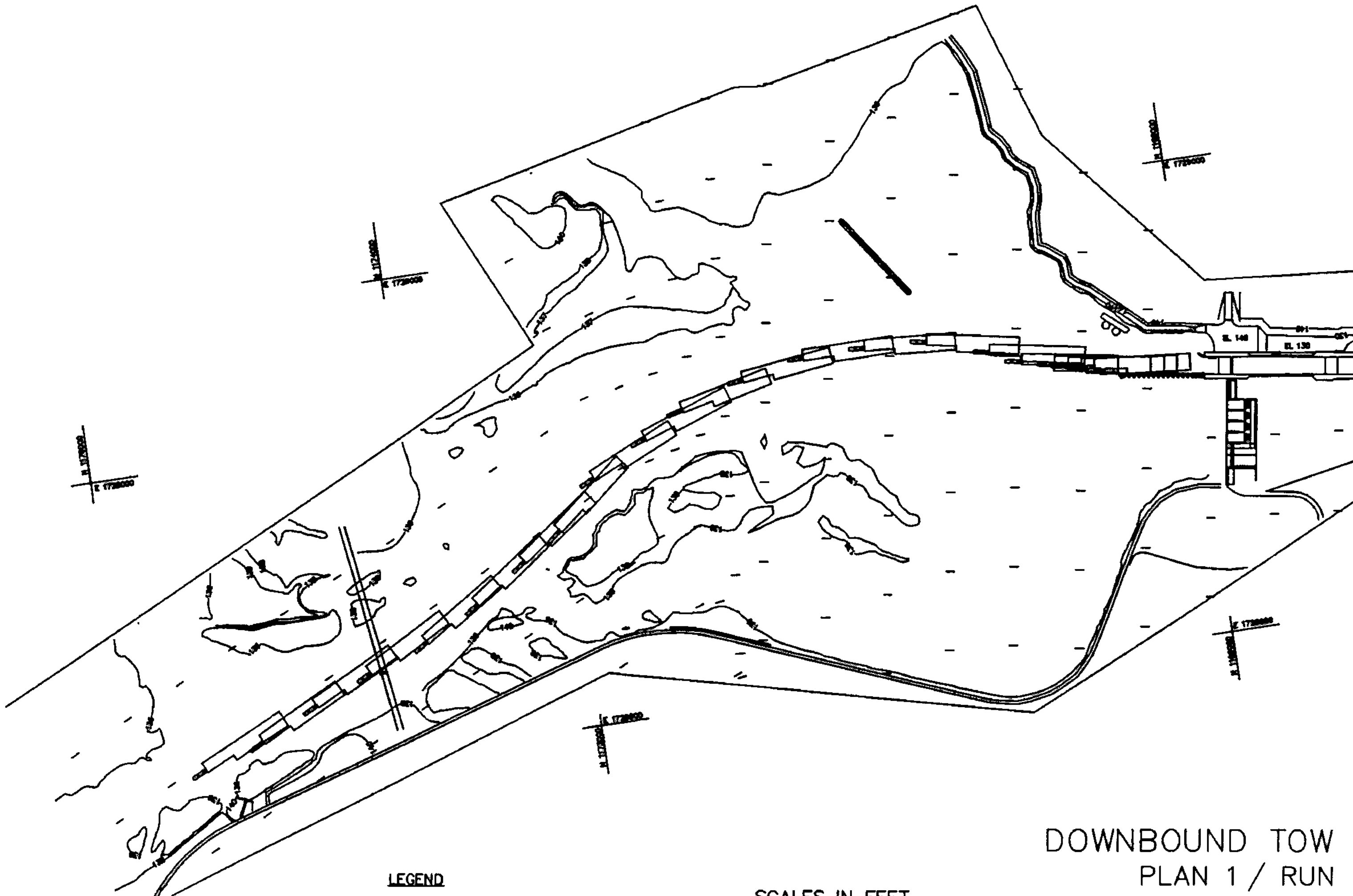

DOWNBOUND TOW TRACK
PLAN 1 / RUN 1
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
PLAN 1 / RUN 2
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
PLAN 1 / RUN 3
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



DOWNBOUND TOW TRACK
PLAN 1 / RUN 4
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 146
EL 138



LEGEND

NOTE : 8–BARGE TOW

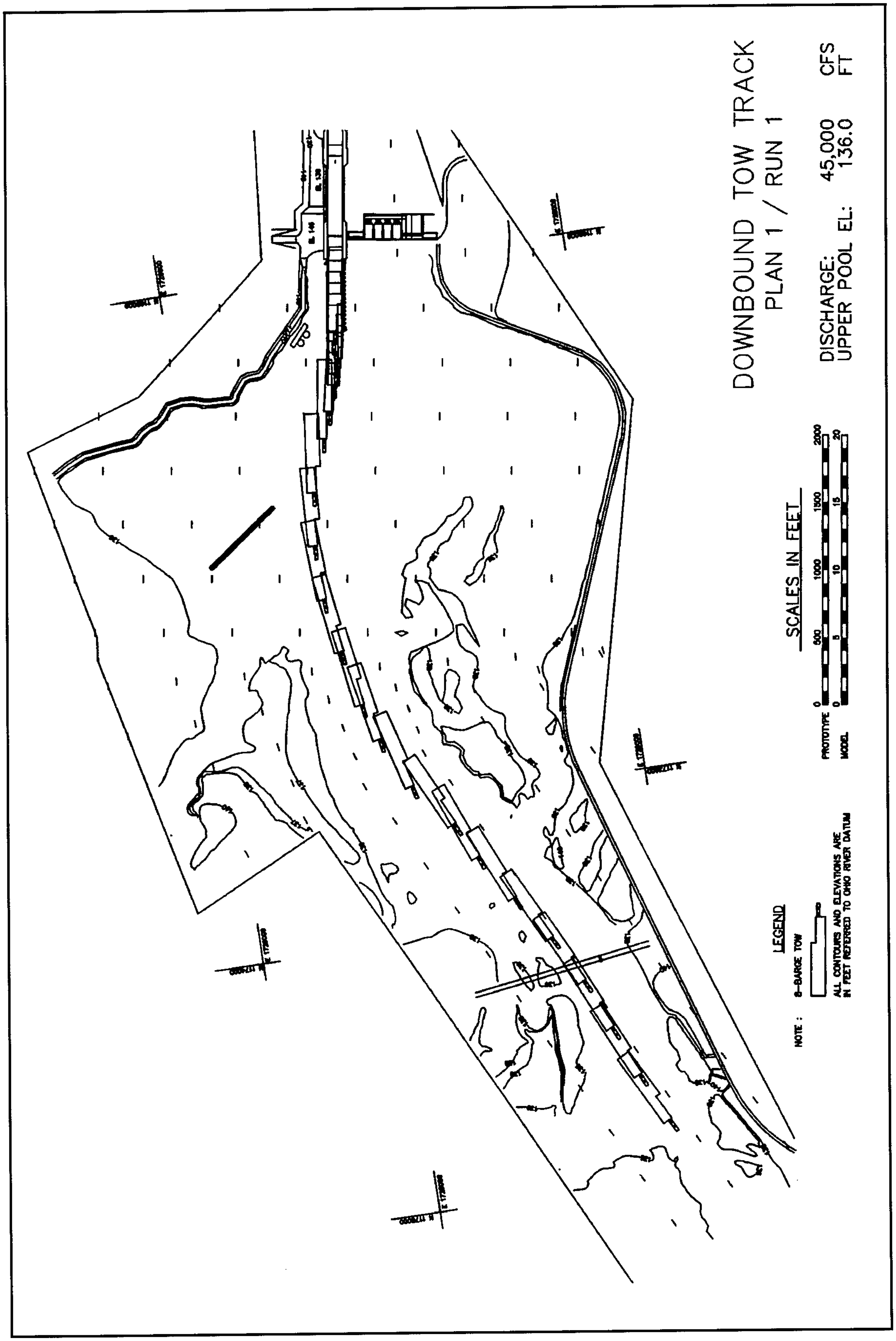
ALL CONTOURS AND ELEVATIONS ARE
IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

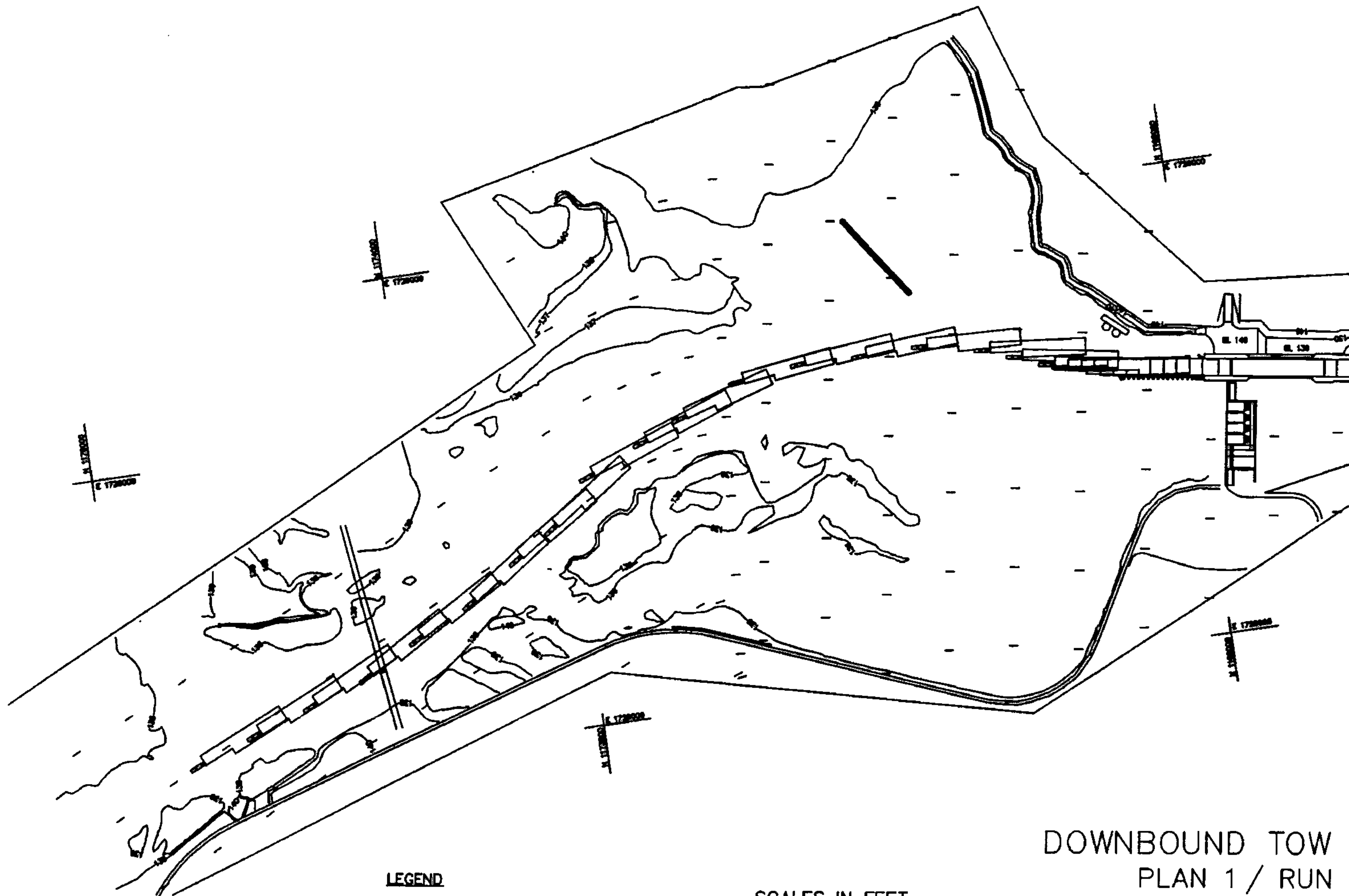
PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20

DOWNBOUND TOW TRACK
PLAN 1 / RUN 5

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT



DOWNBOUND TOW TRACK
PLAN 1 / RUN 1
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE: 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 1 / RUN 2

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT

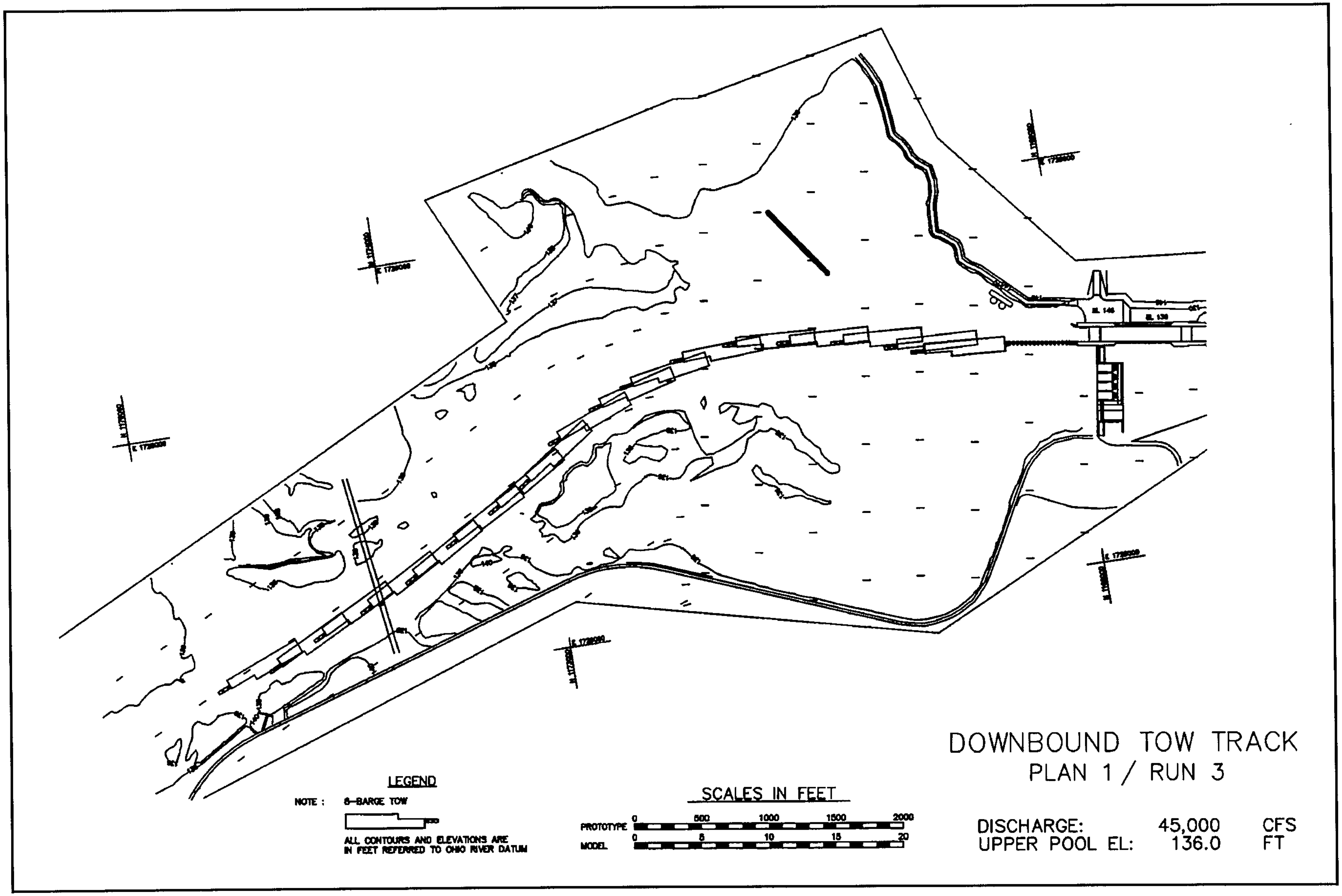
LEGEND

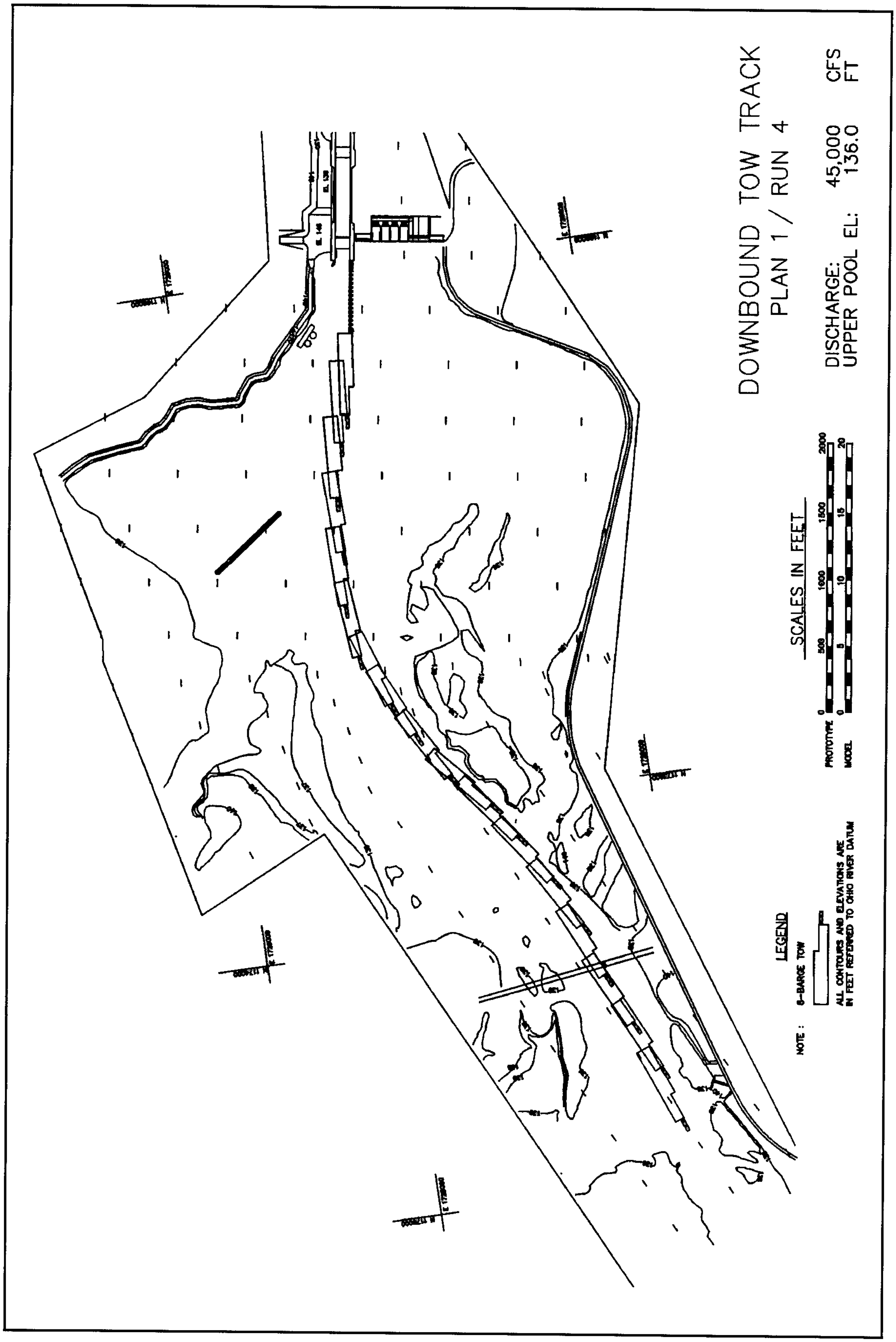
NOTE : 8-BARGE TOW

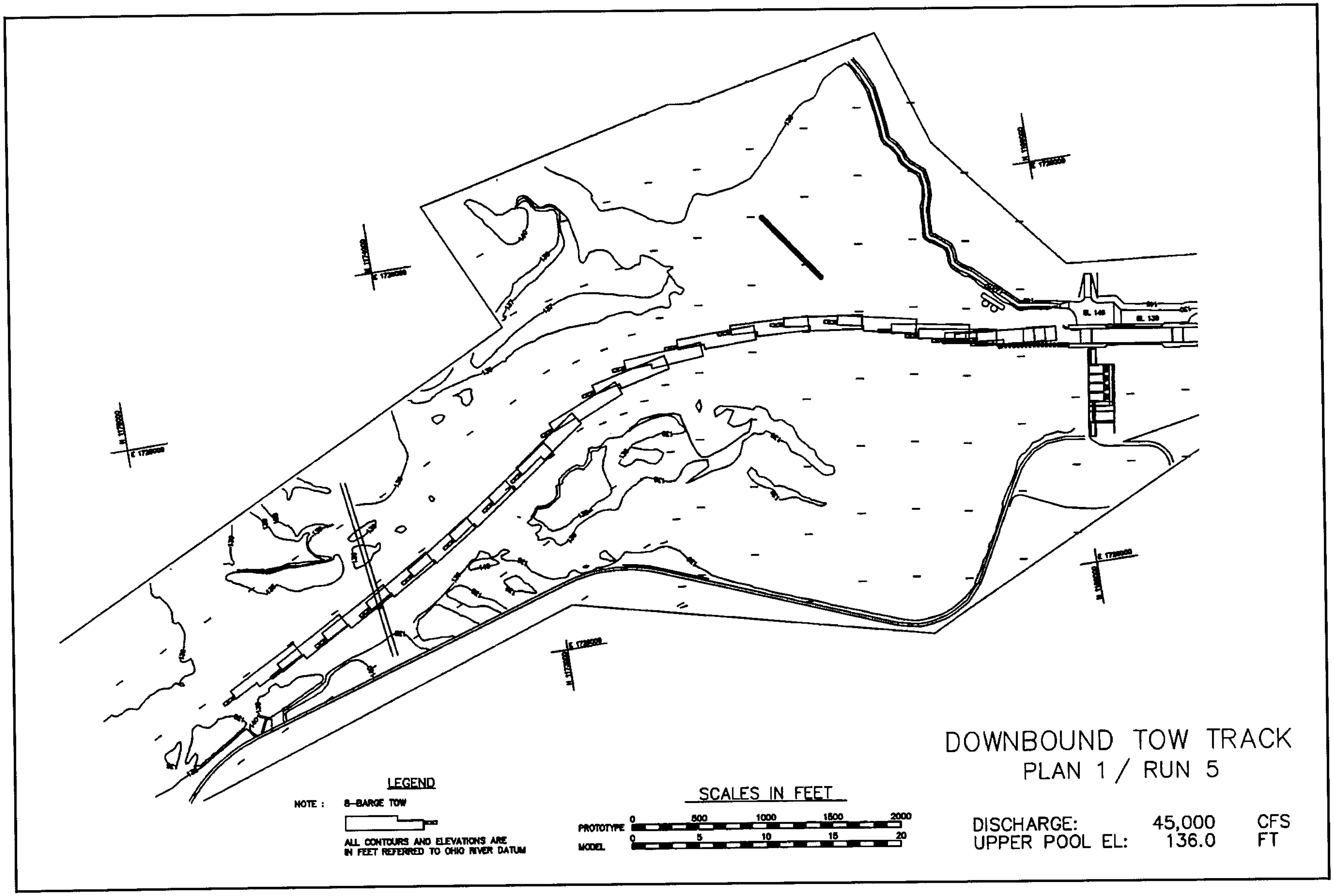
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

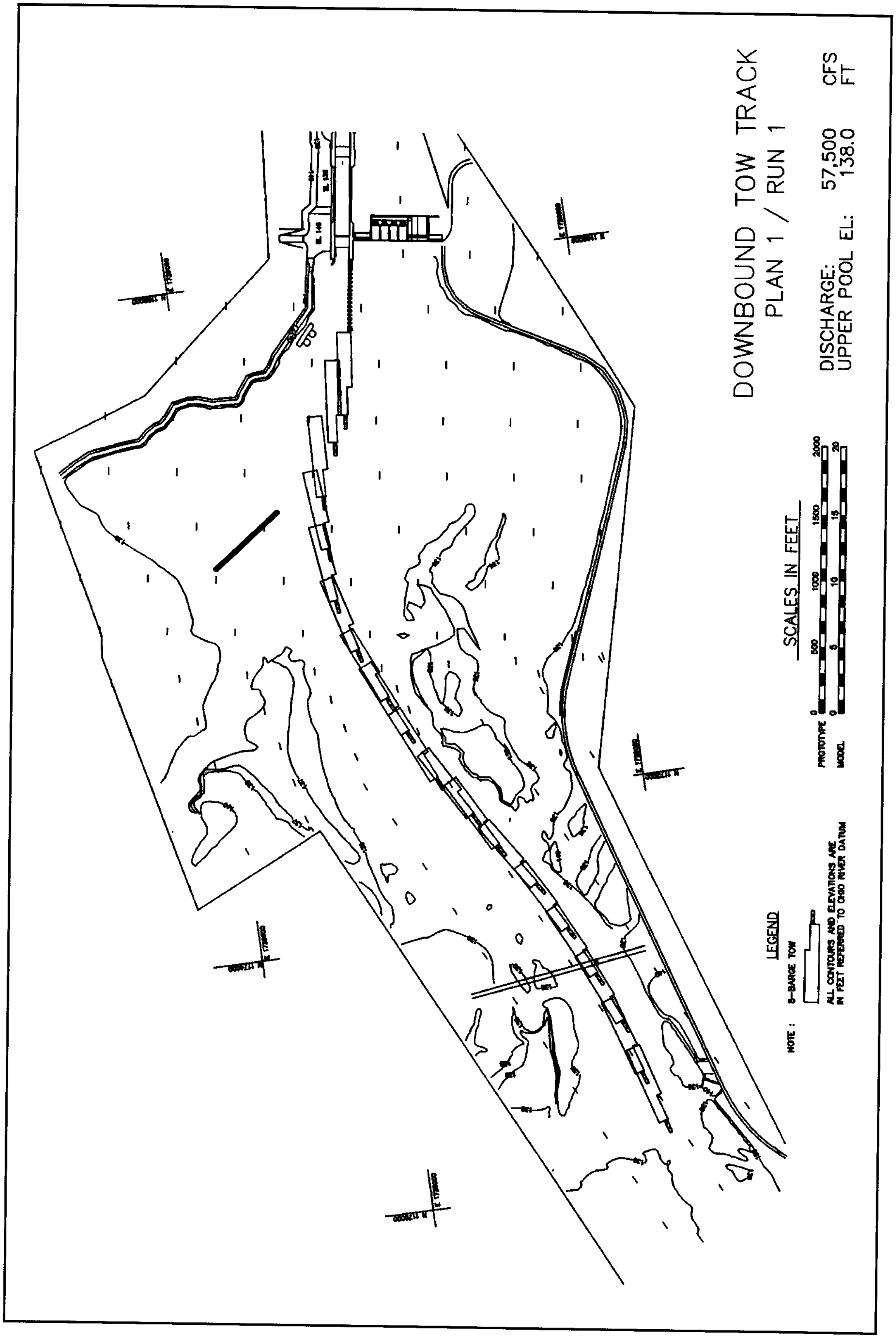
SCALES IN FEET

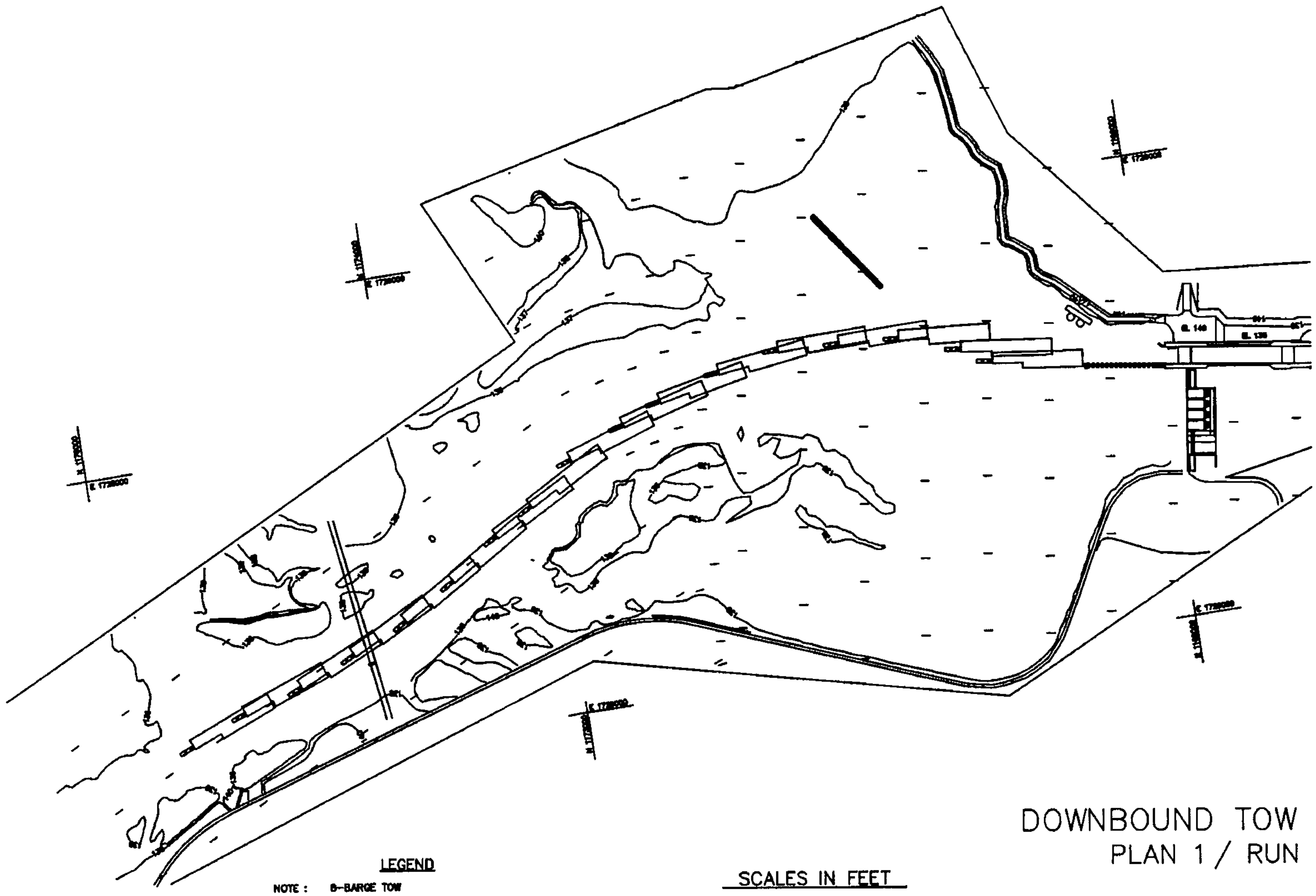
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
PLAN 1 / RUN 3
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE : 6-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
PLAN 1 / RUN 4
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 146
EL 139
DOWNBOUND TOW TRACK
PLAN 1 / RUN 5
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT


DOWNBOUND TOW TRACK
PLAN 1 / RUN 1
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE: ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 1 / RUN 2

DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT

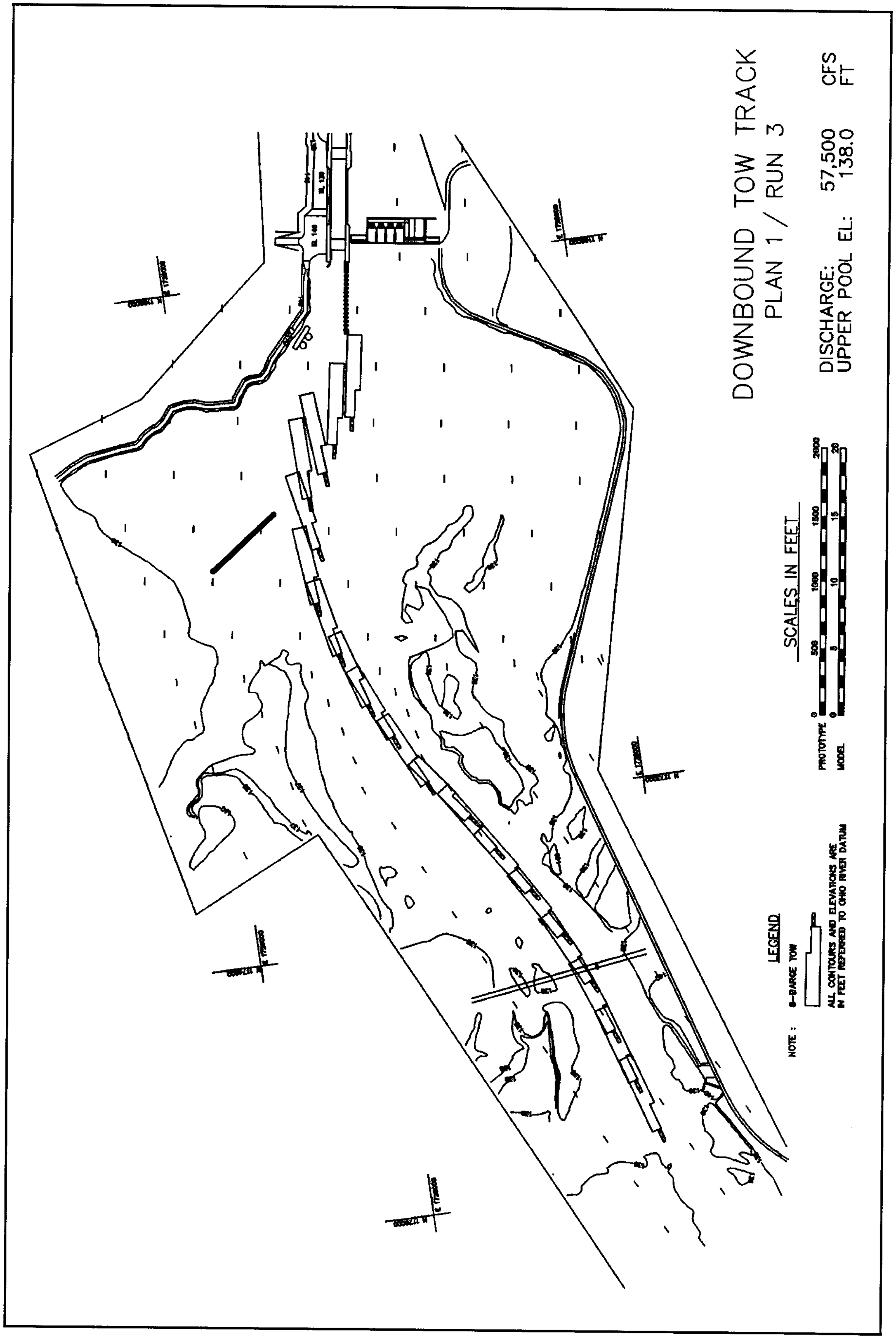
LEGEND

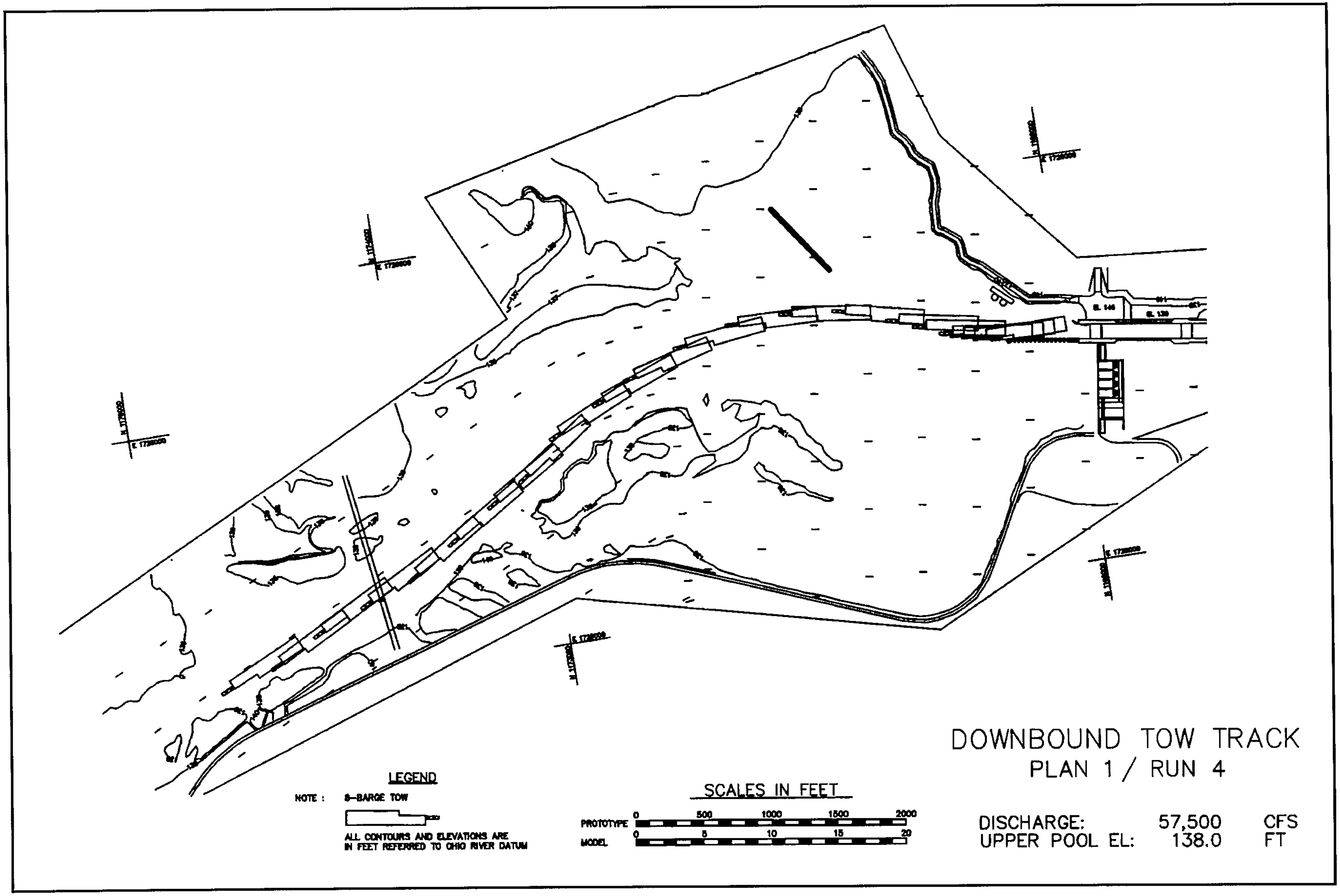
NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

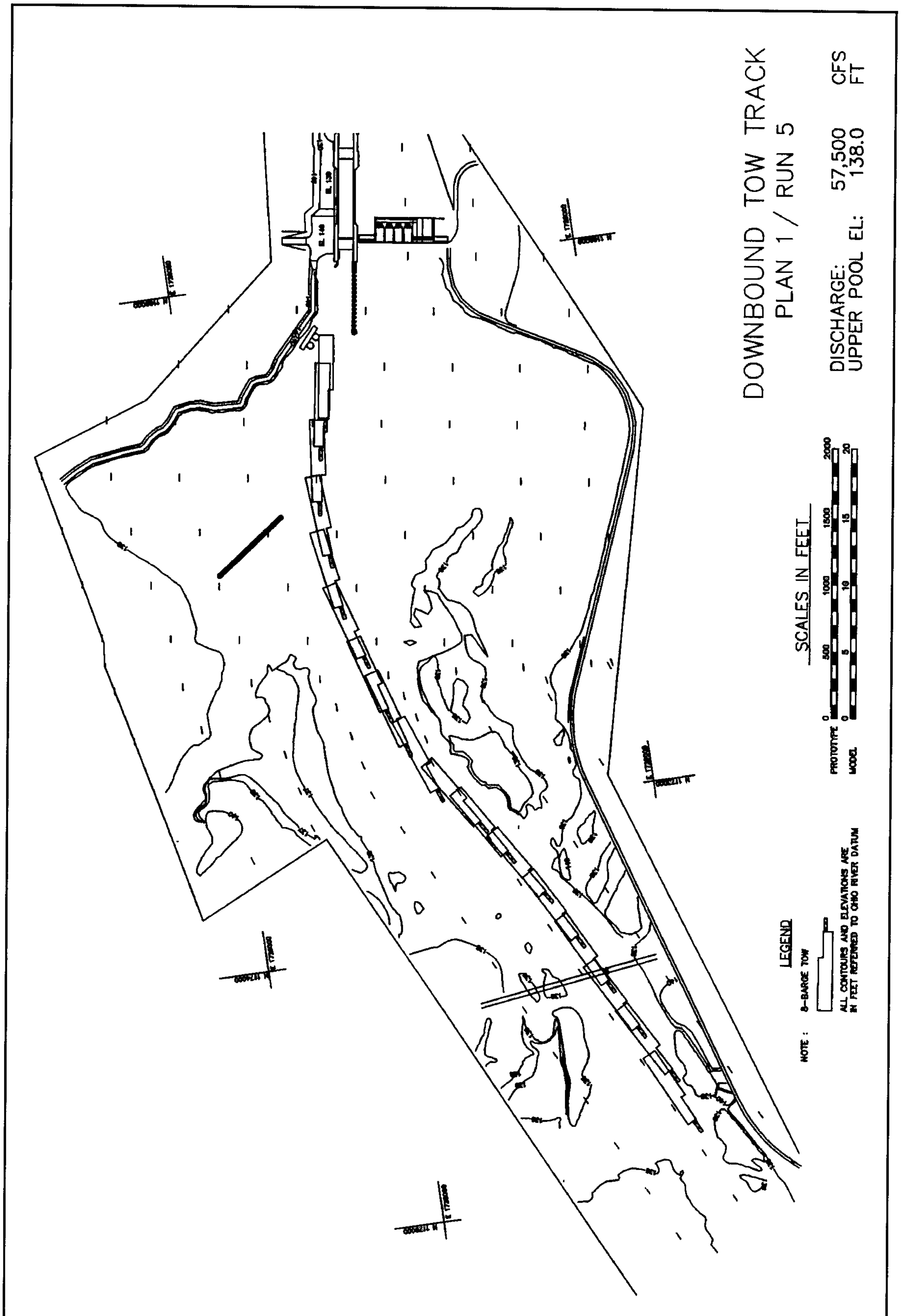
SCALES IN FEET

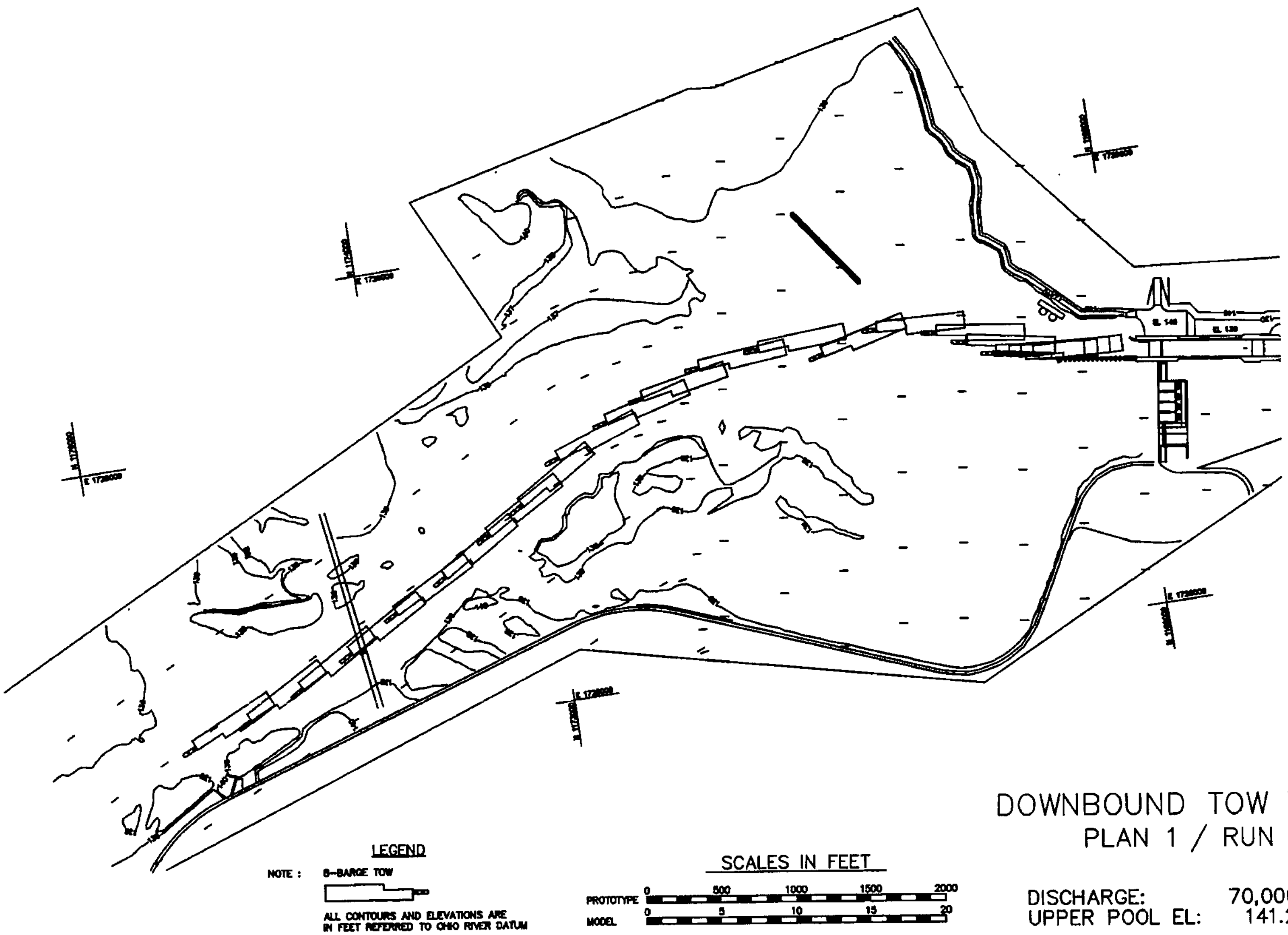
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
PLAN 1 / RUN 3
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE :
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



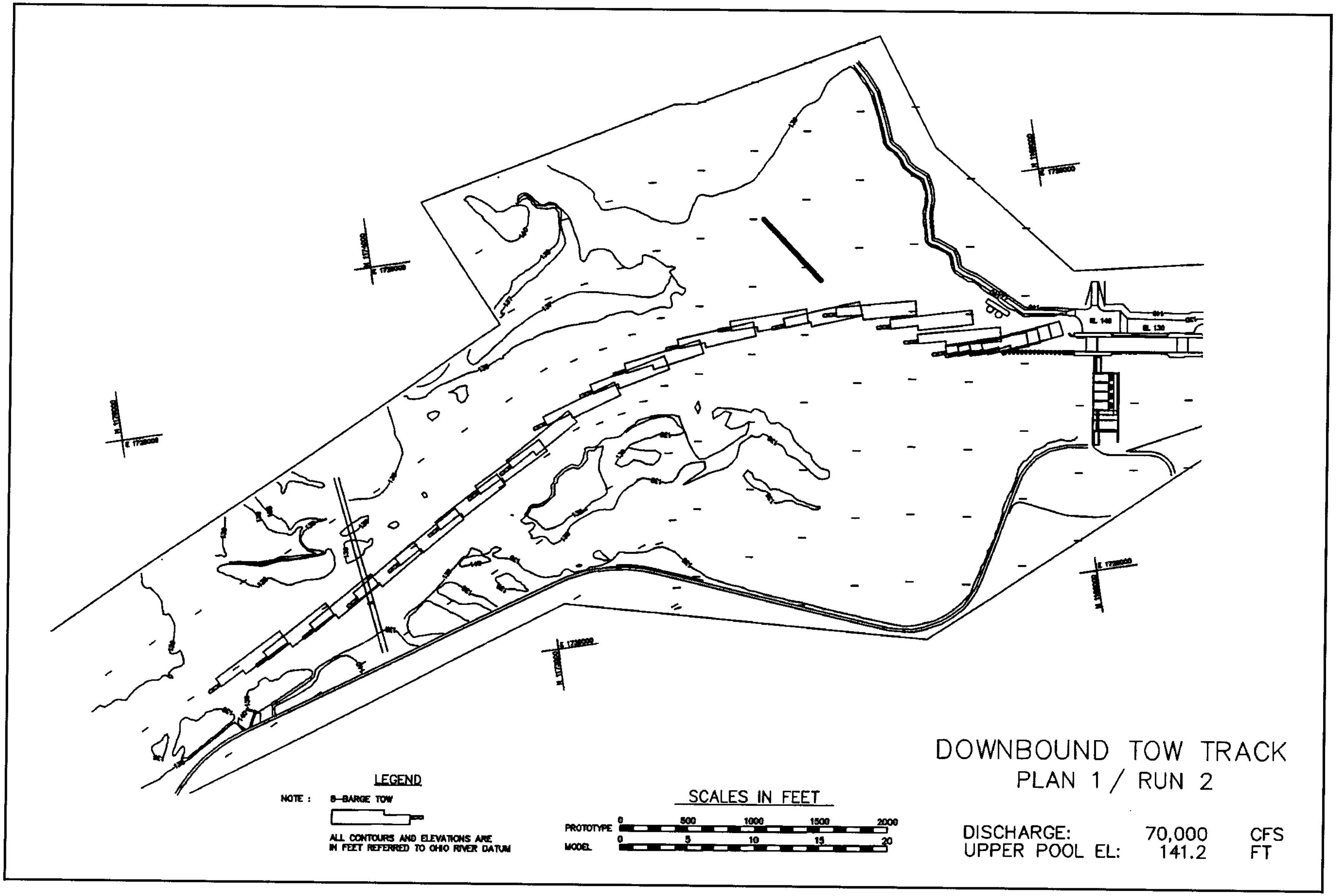
DOWNBOUND TOW TRACK
PLAN 1 / RUN 4
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 146
EL 139

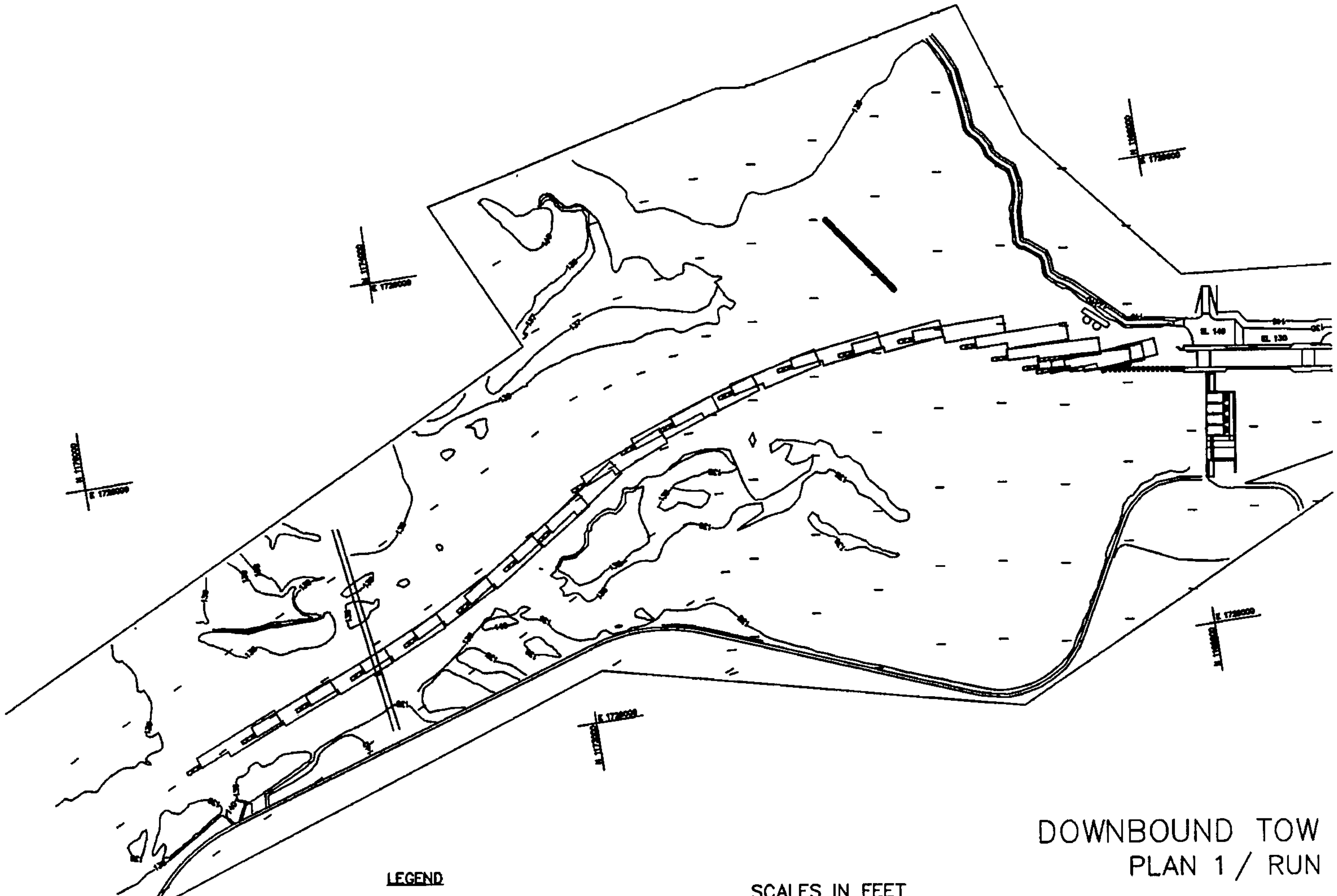

DOWNBOUND TOW TRACK
PLAN 1 / RUN 5
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE : ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 1 / RUN 1

DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT


DOWNBOUND TOW TRACK
PLAN 1 / RUN 2
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 140
EL 130



LEGEND

NOTE : 5-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

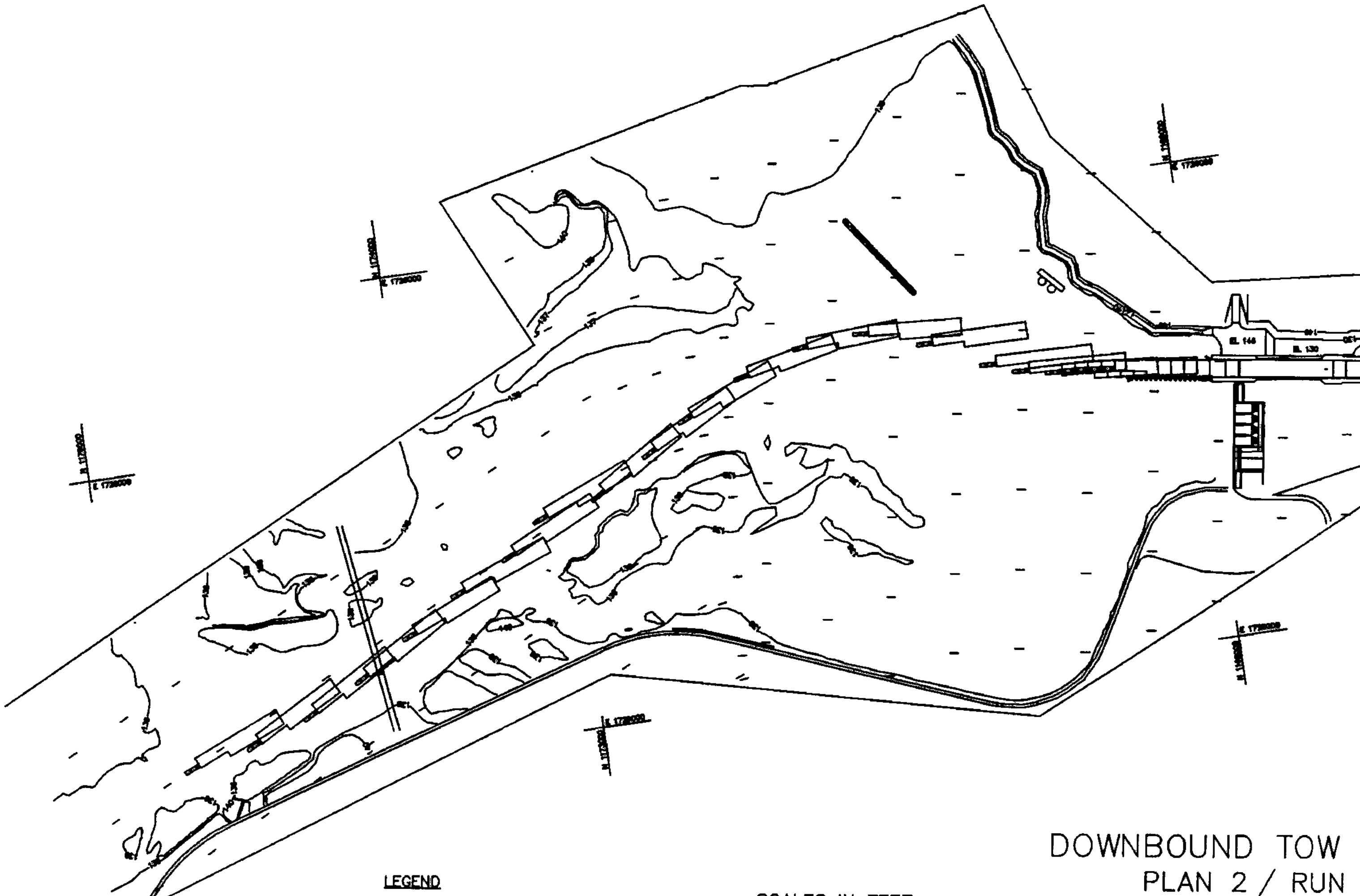
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
PLAN 1 / RUN 3

DISCHARGE:	70,000	CFS
UPPER POOL EL:	141.2	FT



DOWNBOUND TOW TRACK
PLAN 2 / RUN 1

LEGEND

NOTE : 8-BARGE TOW

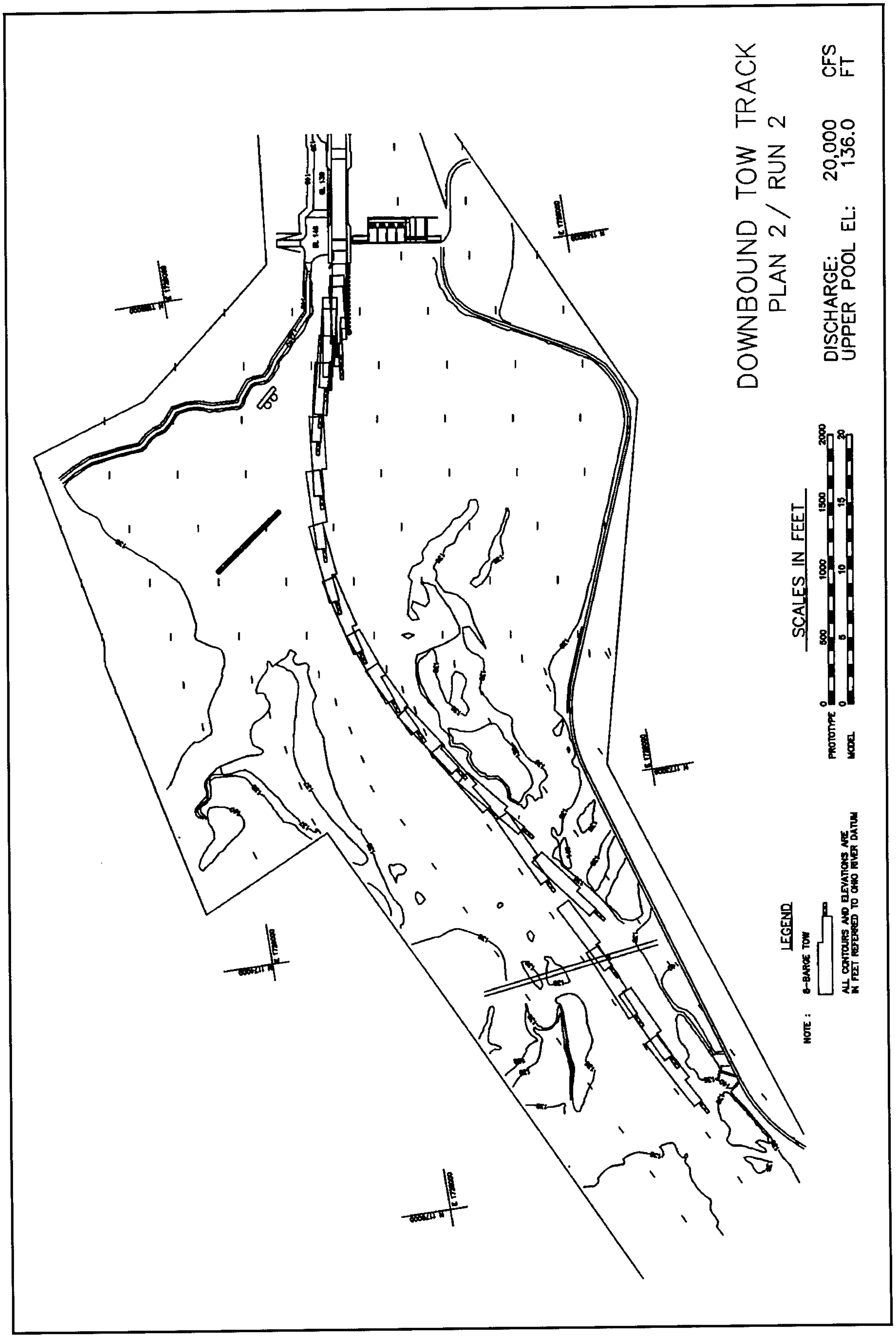
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

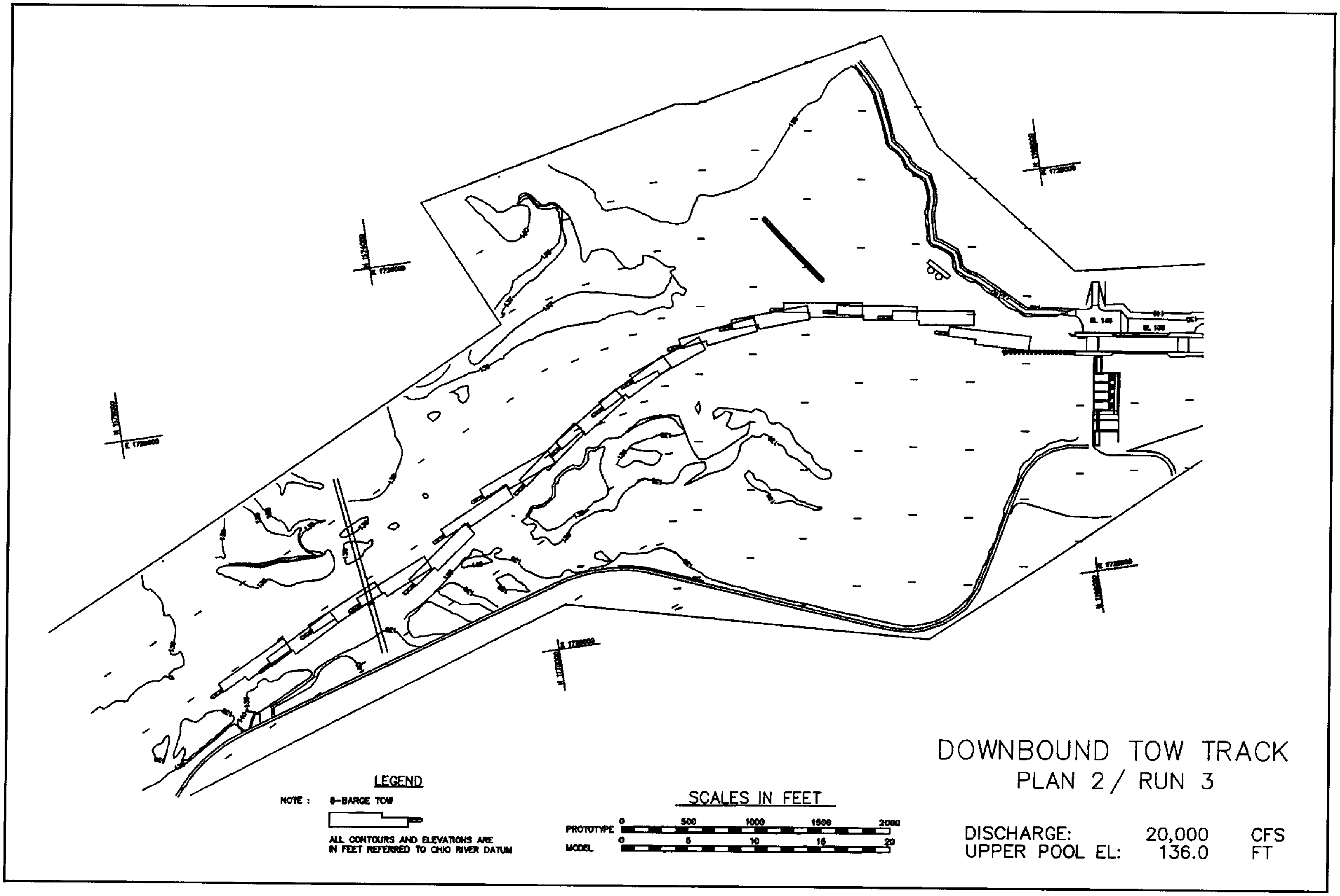
SCALES IN FEET

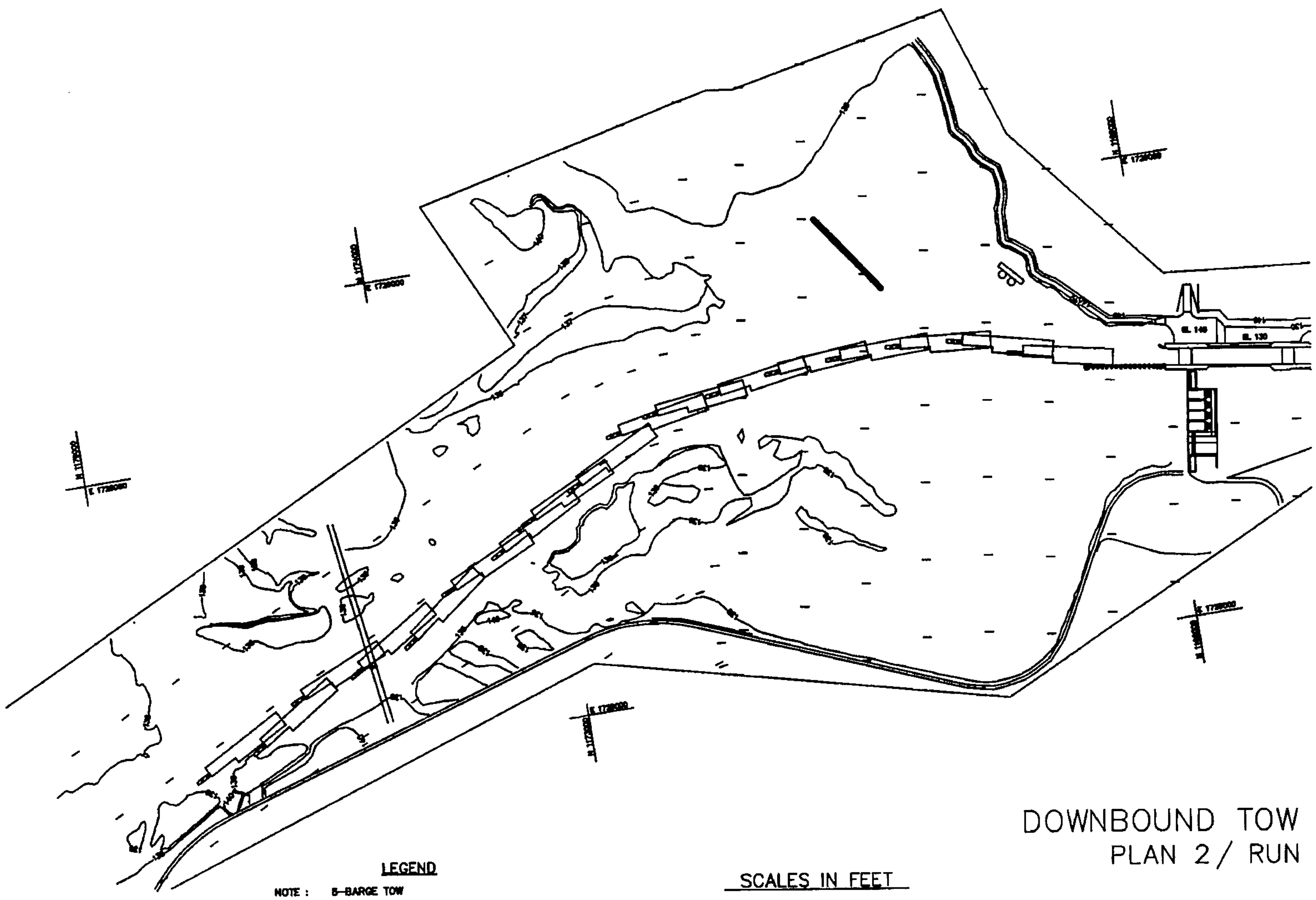
PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DISCHARGE:	20,000	CFS
UPPER POOL EL:	136.0	FT


DOWNBOUND TOW TRACK
PLAN 2 / RUN 2
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
6-BARGE TOW
NOTE : ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
DOWNBOUND TOW TRACK
PLAN 2 / RUN 3
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT



DOWNBOUND TOW TRACK
PLAN 2 / RUN 4

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT

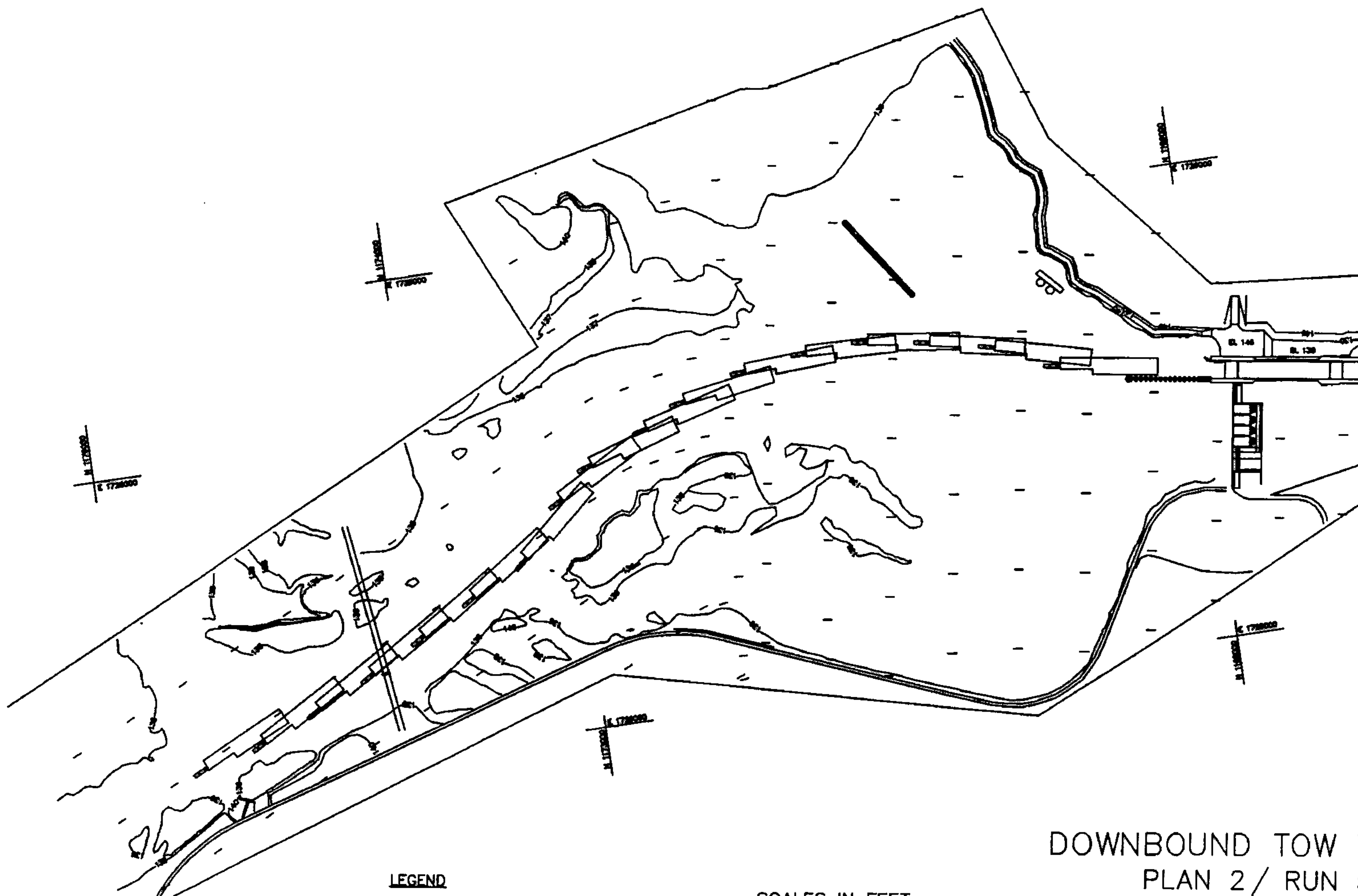
LEGEND

NOTE : 5-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE
IN FEET REFERRED TO OHIO RIVER DATUM

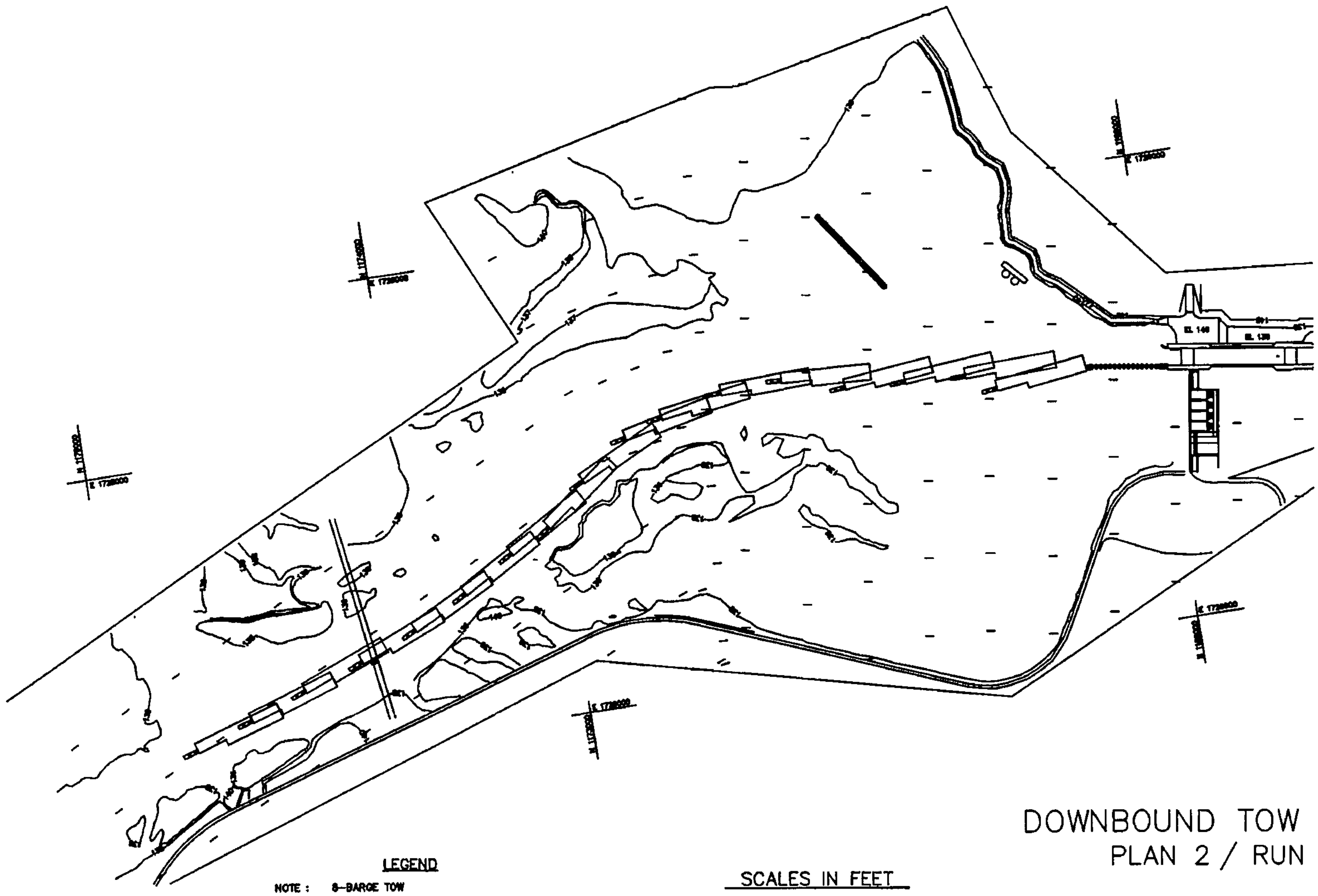
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
PLAN 2/ RUN 5

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT



DOWNBOUND TOW TRACK
PLAN 2 / RUN 1

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT

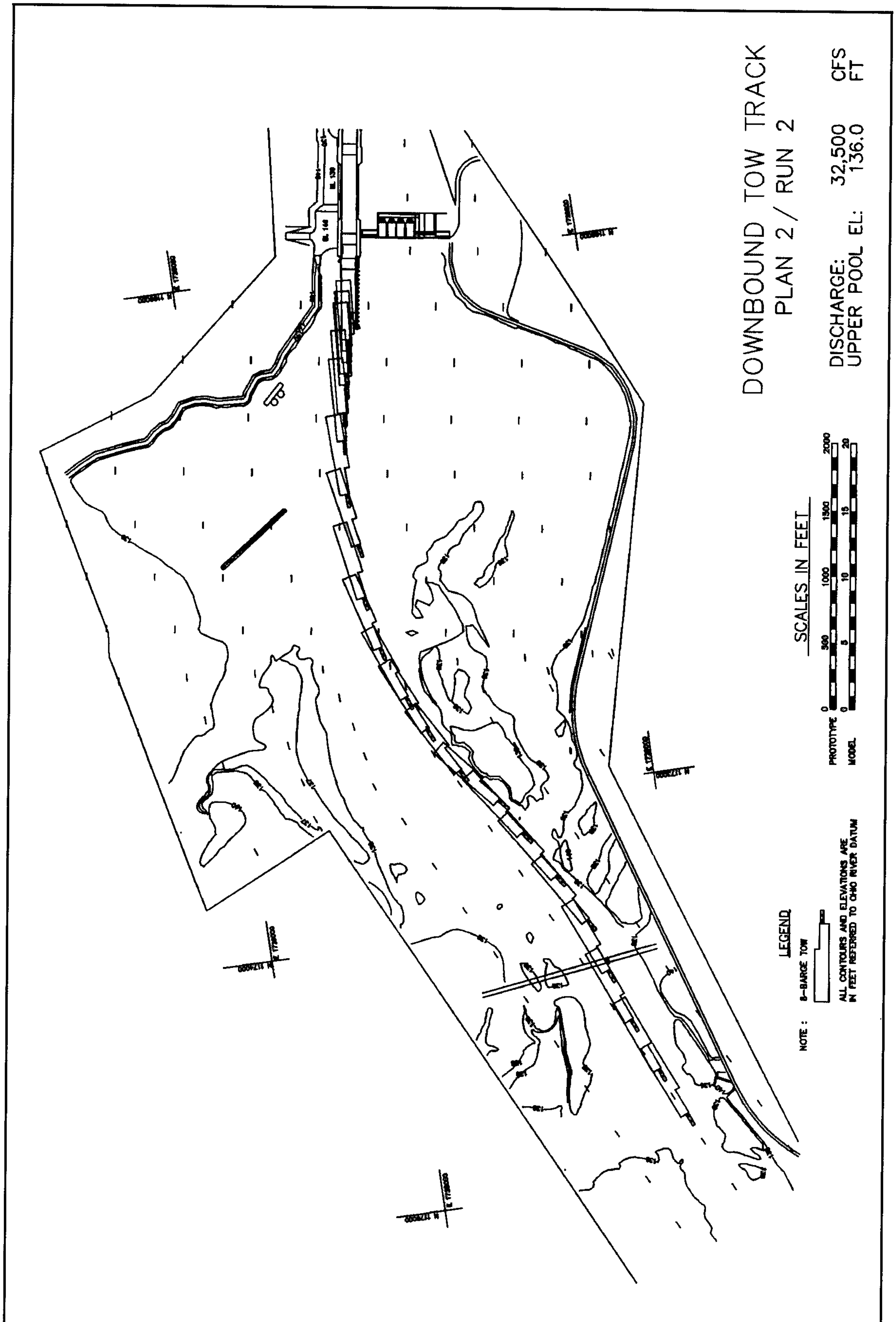
LEGEND

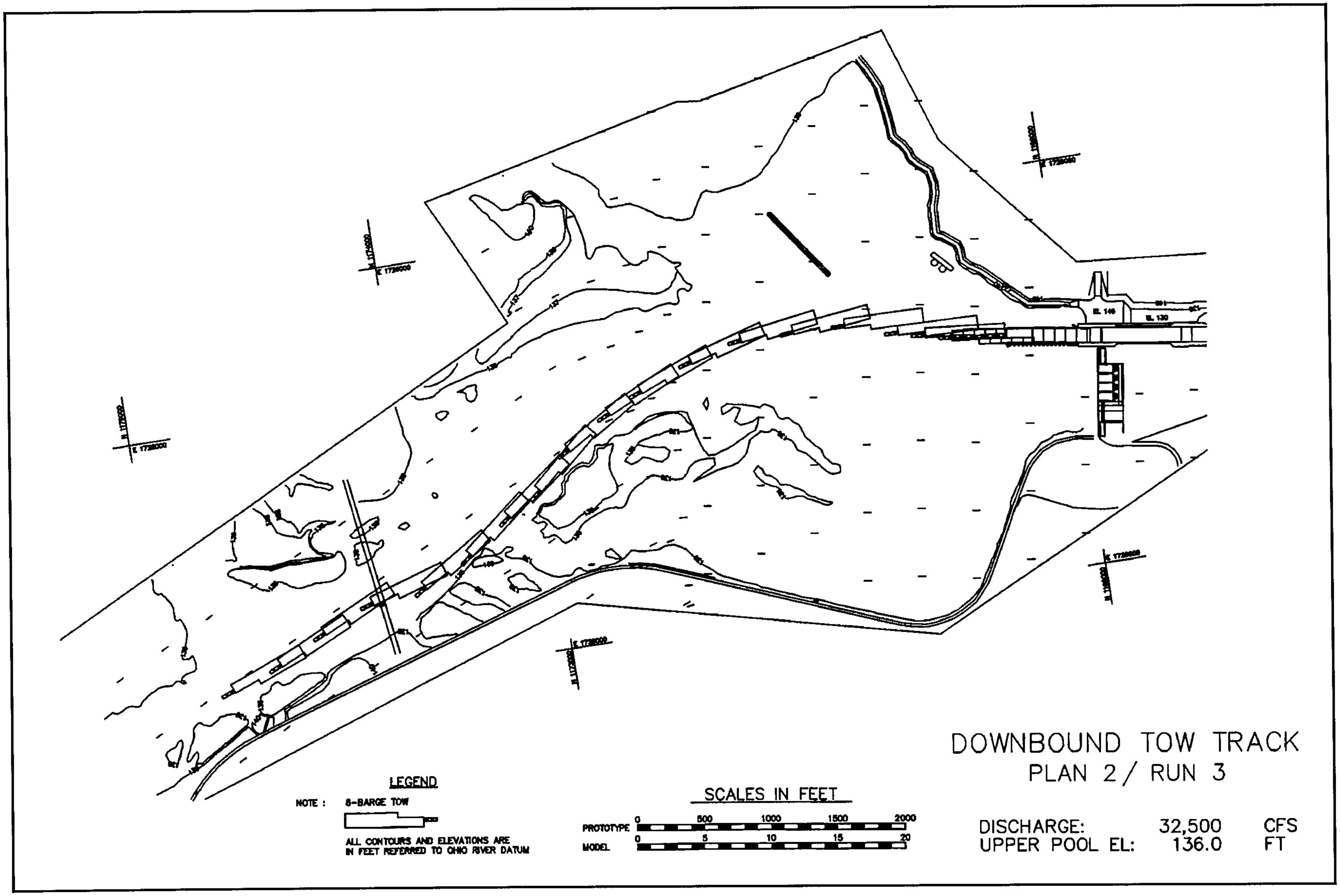
NOTE : 8-BARGE TOW

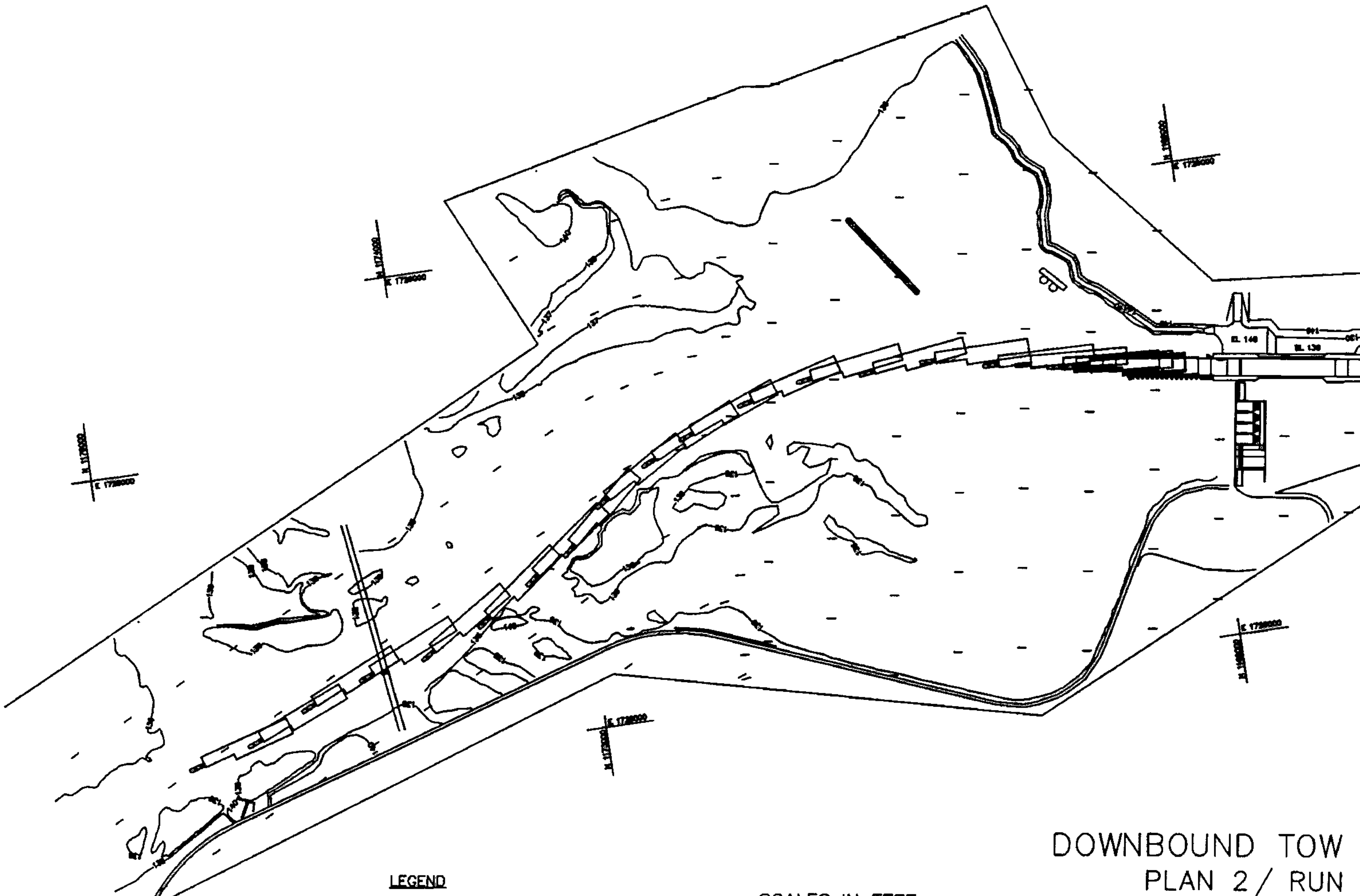
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
PLAN 2 / RUN 2
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE: ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
PLAN 2 / RUN 3
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 146
EL 130



DOWNBOUND TOW TRACK
PLAN 2 / RUN 4

LEGEND

NOTE : 8-BARGE TOW

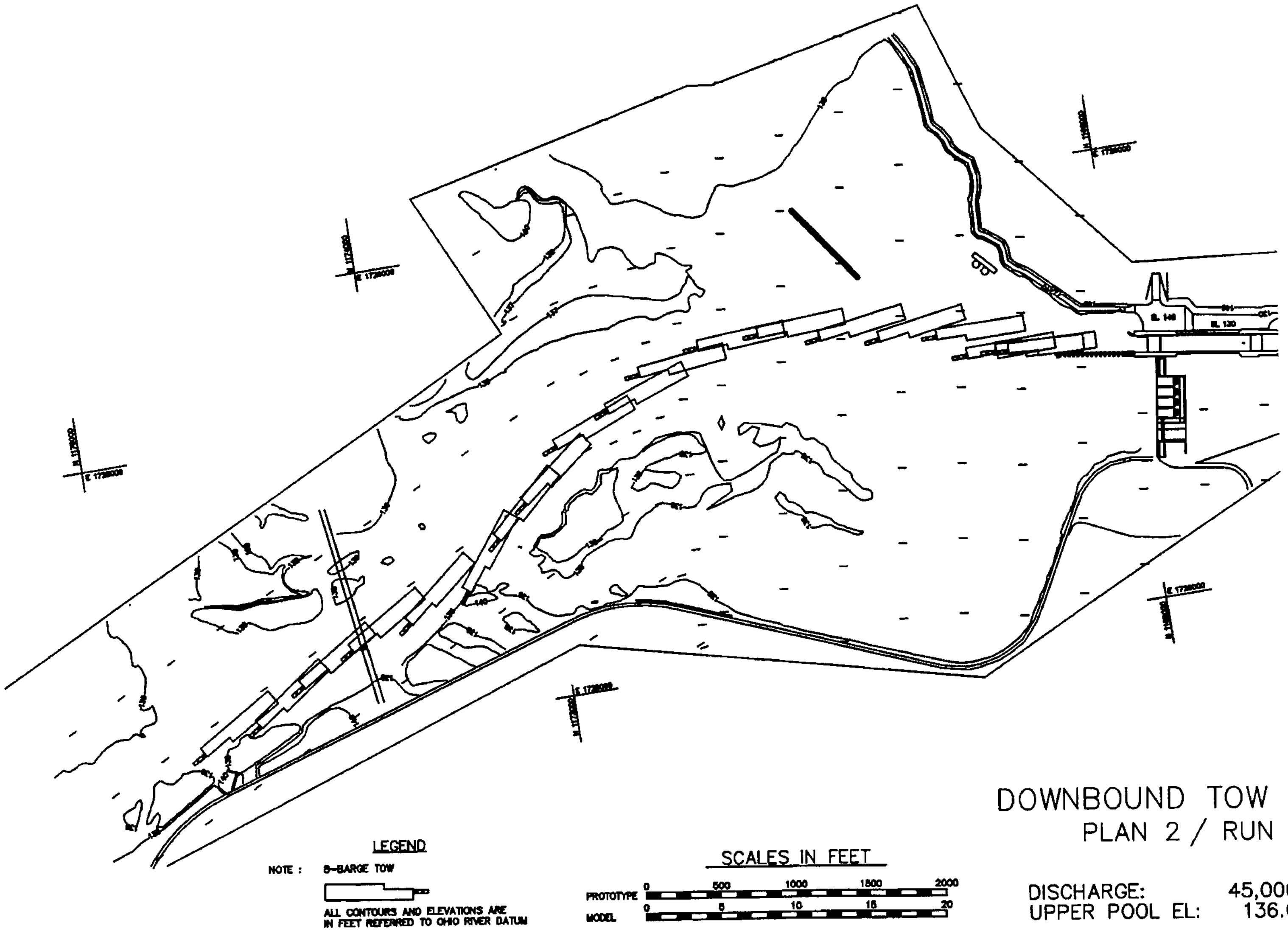
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

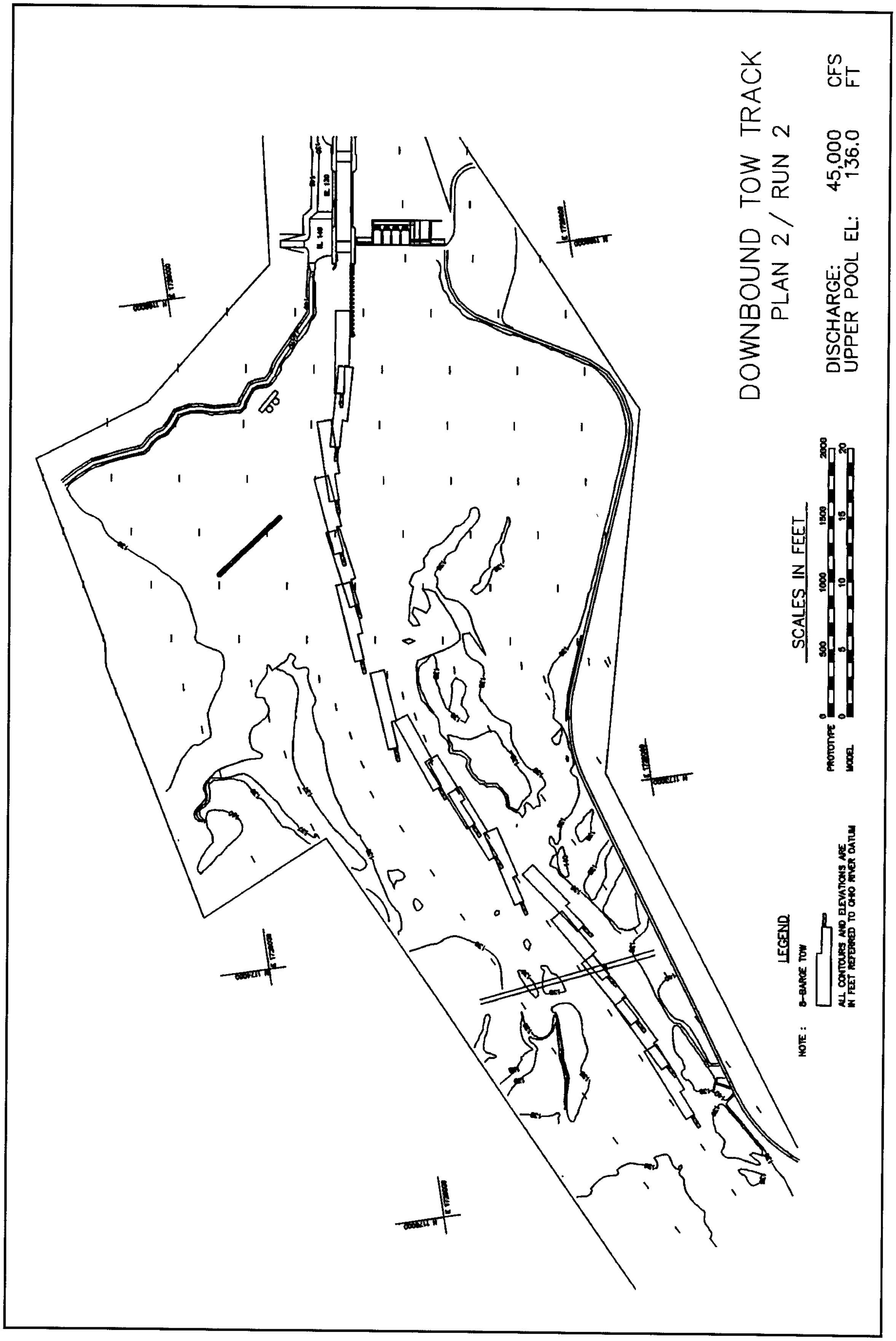
MODEL 0 5 10 15 20

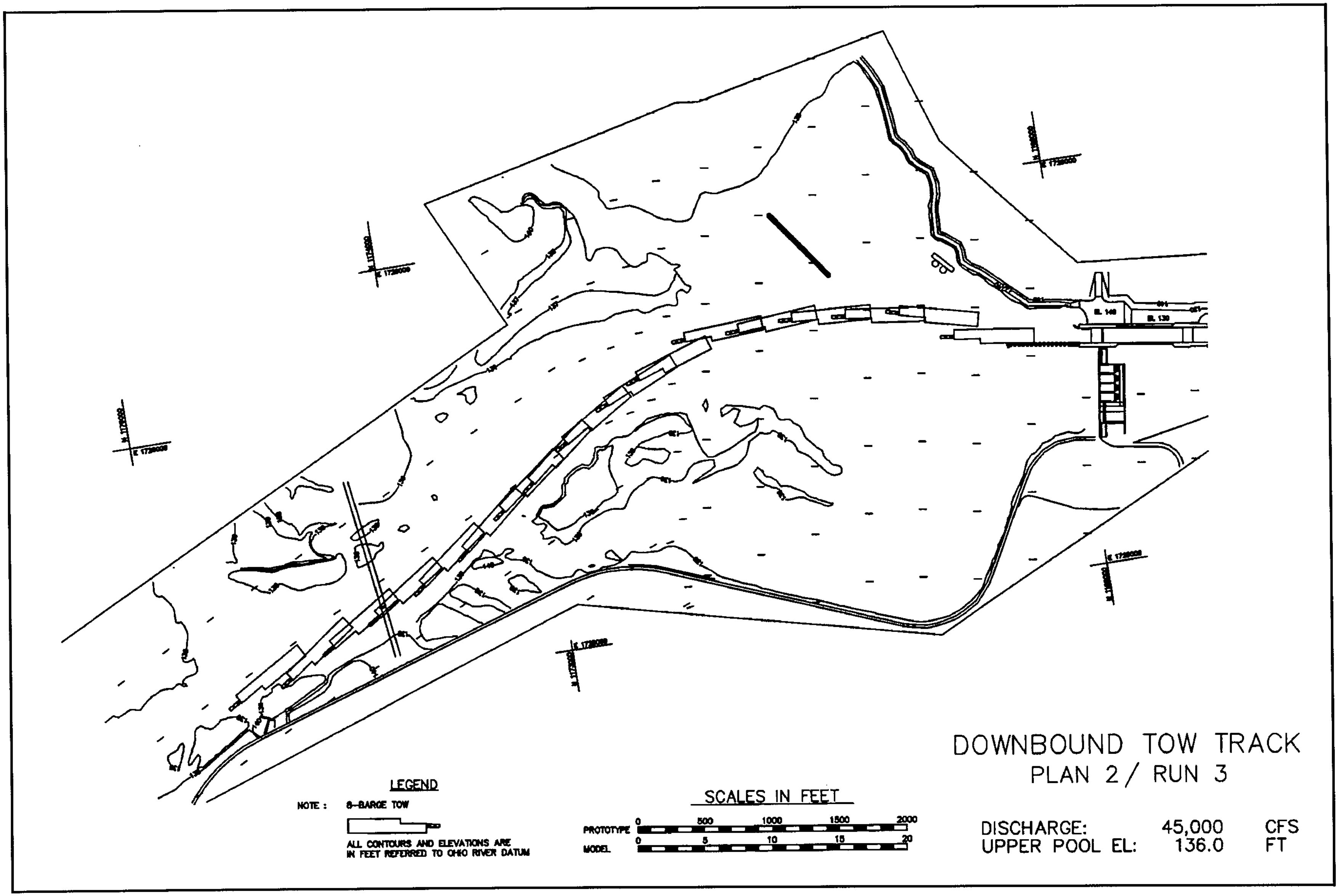
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT



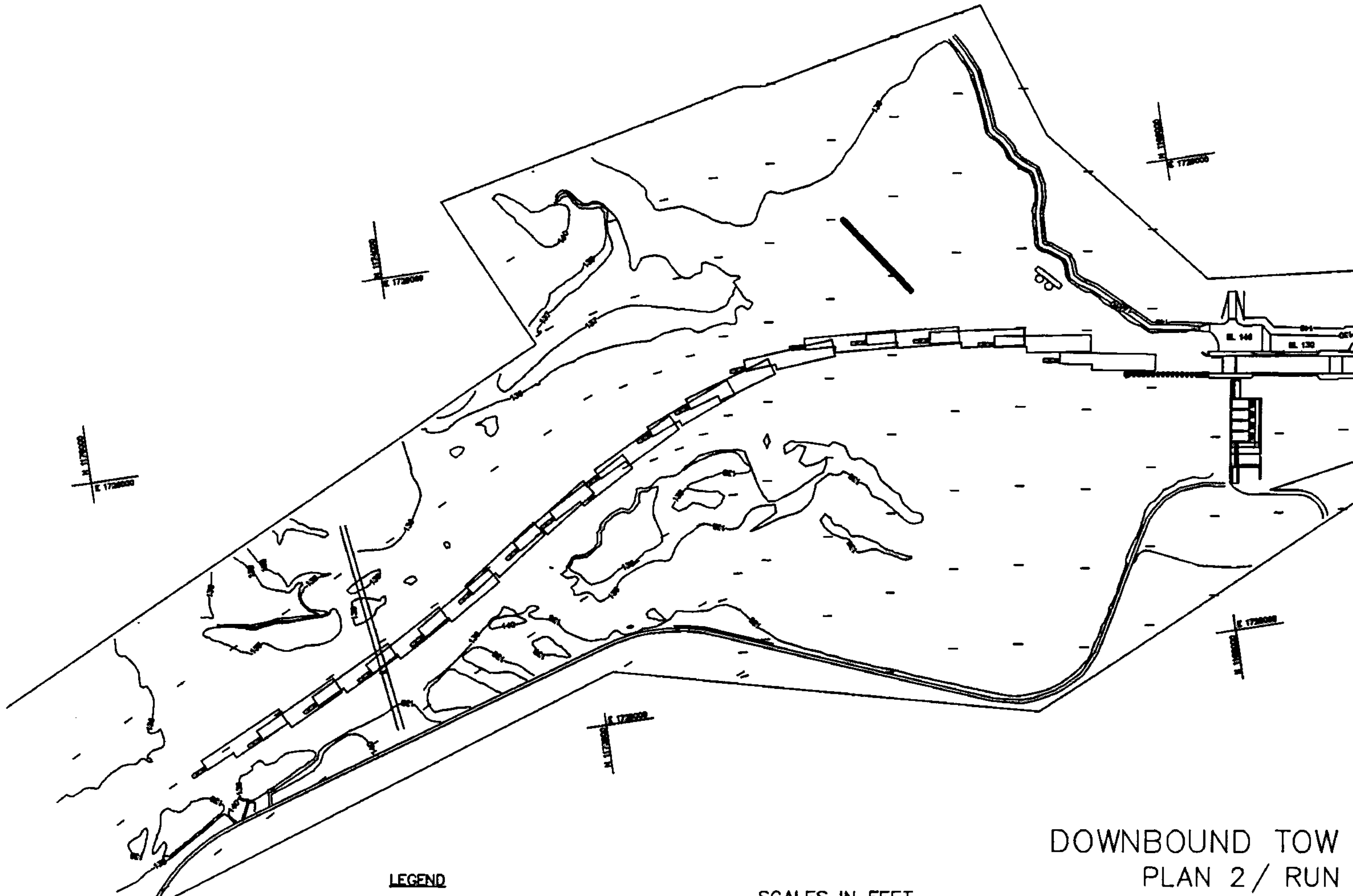
DOWNBOUND TOW TRACK
PLAN 2 / RUN 1

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT


DOWNBOUND TOW TRACK
PLAN 2 / RUN 2
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE: ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 2 / RUN 3
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 140
EL 130



DOWNBOUND TOW TRACK
PLAN 2 / RUN 4

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT

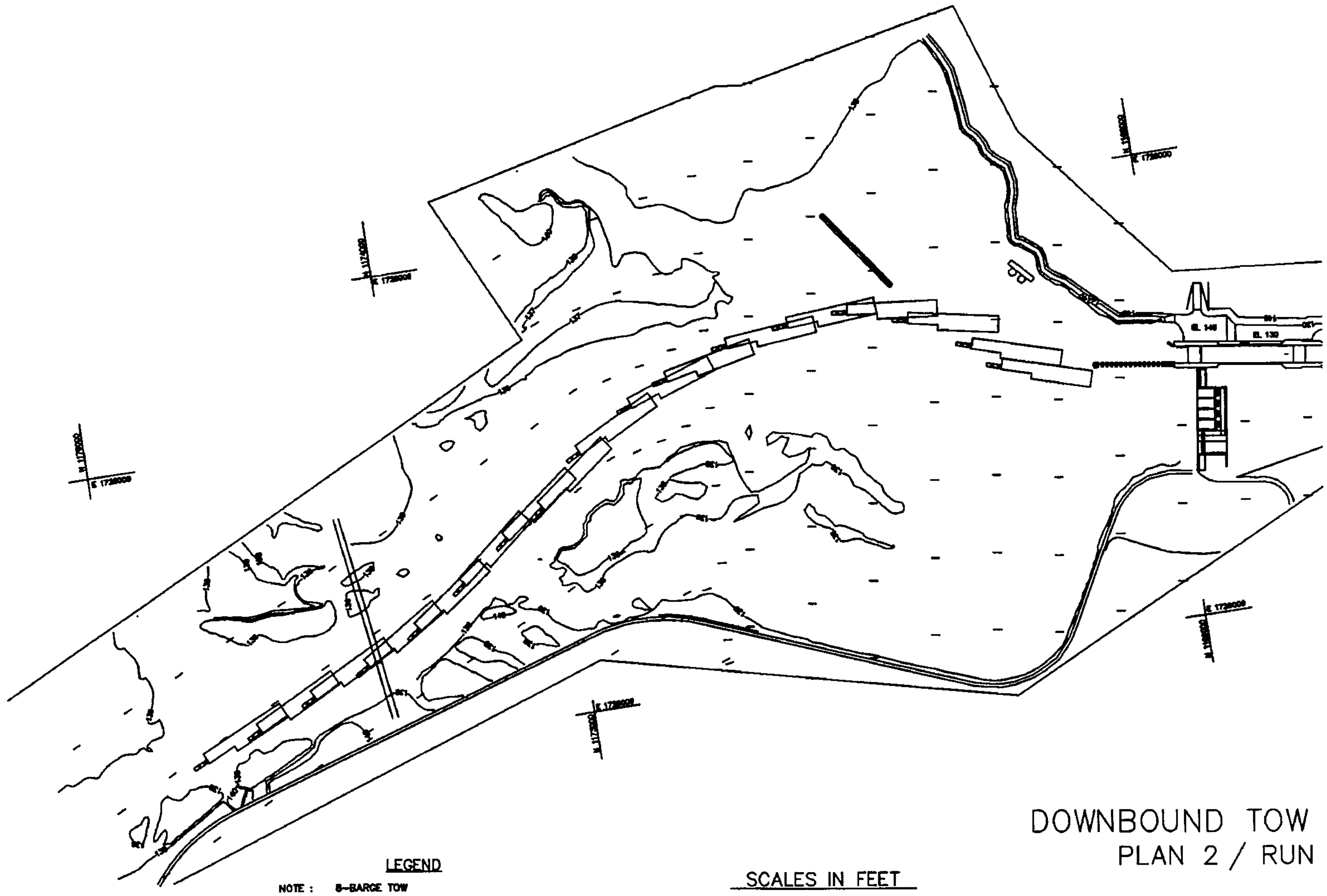
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20

LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 2 / RUN 1

LEGEND

NOTE : 8-BARGE TOW

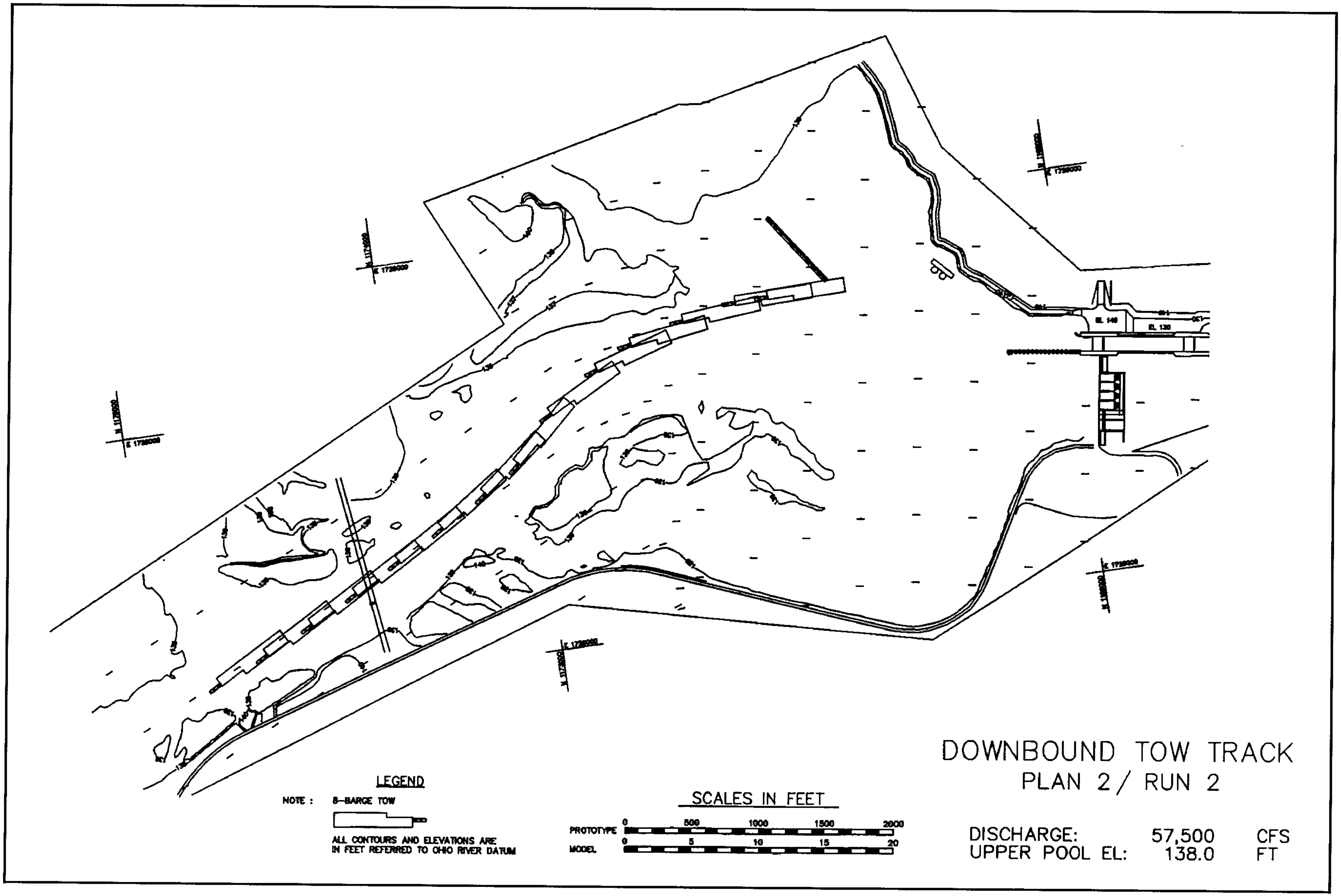
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

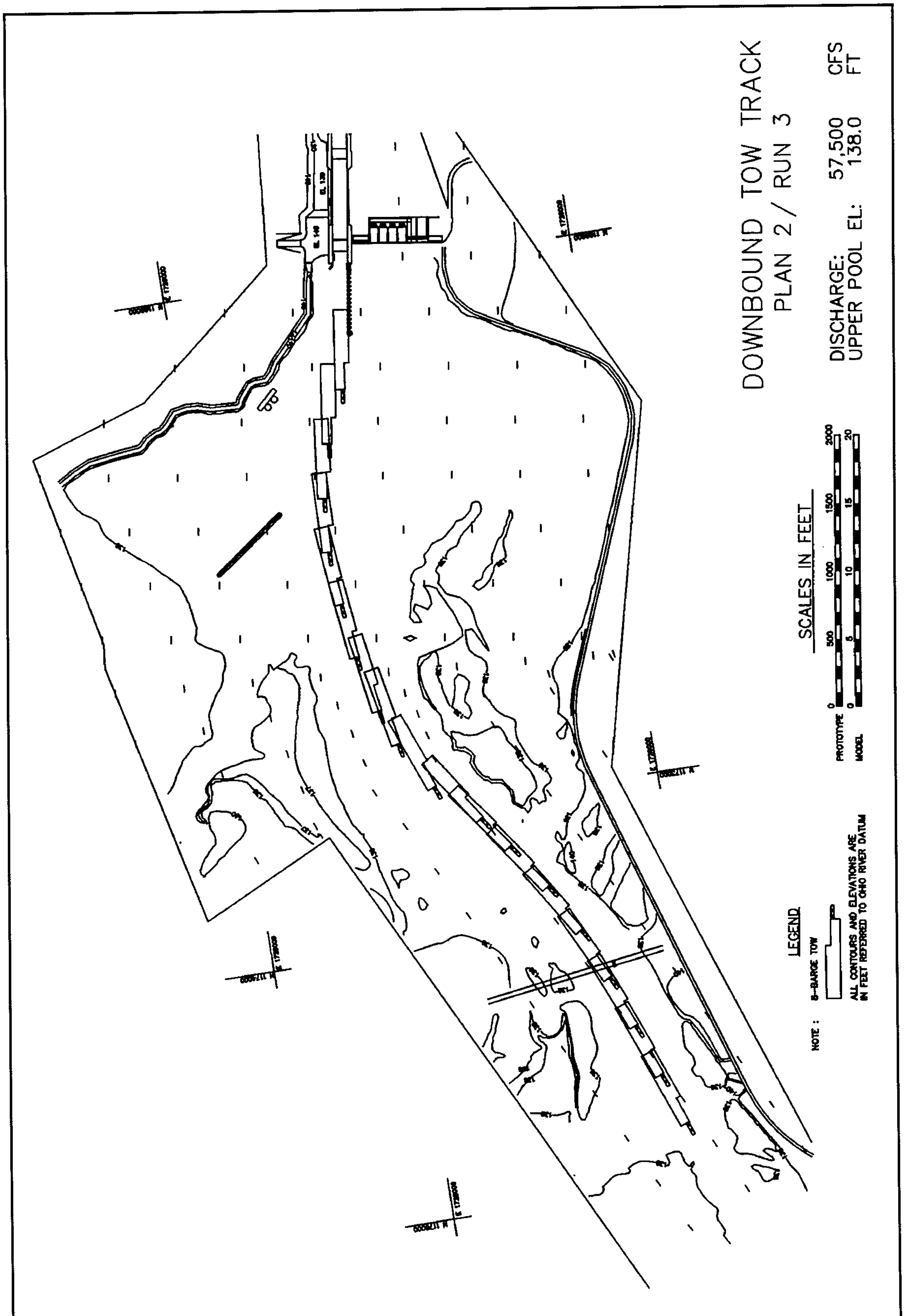
PROTOTYPE 0 500 1000 1500 2000

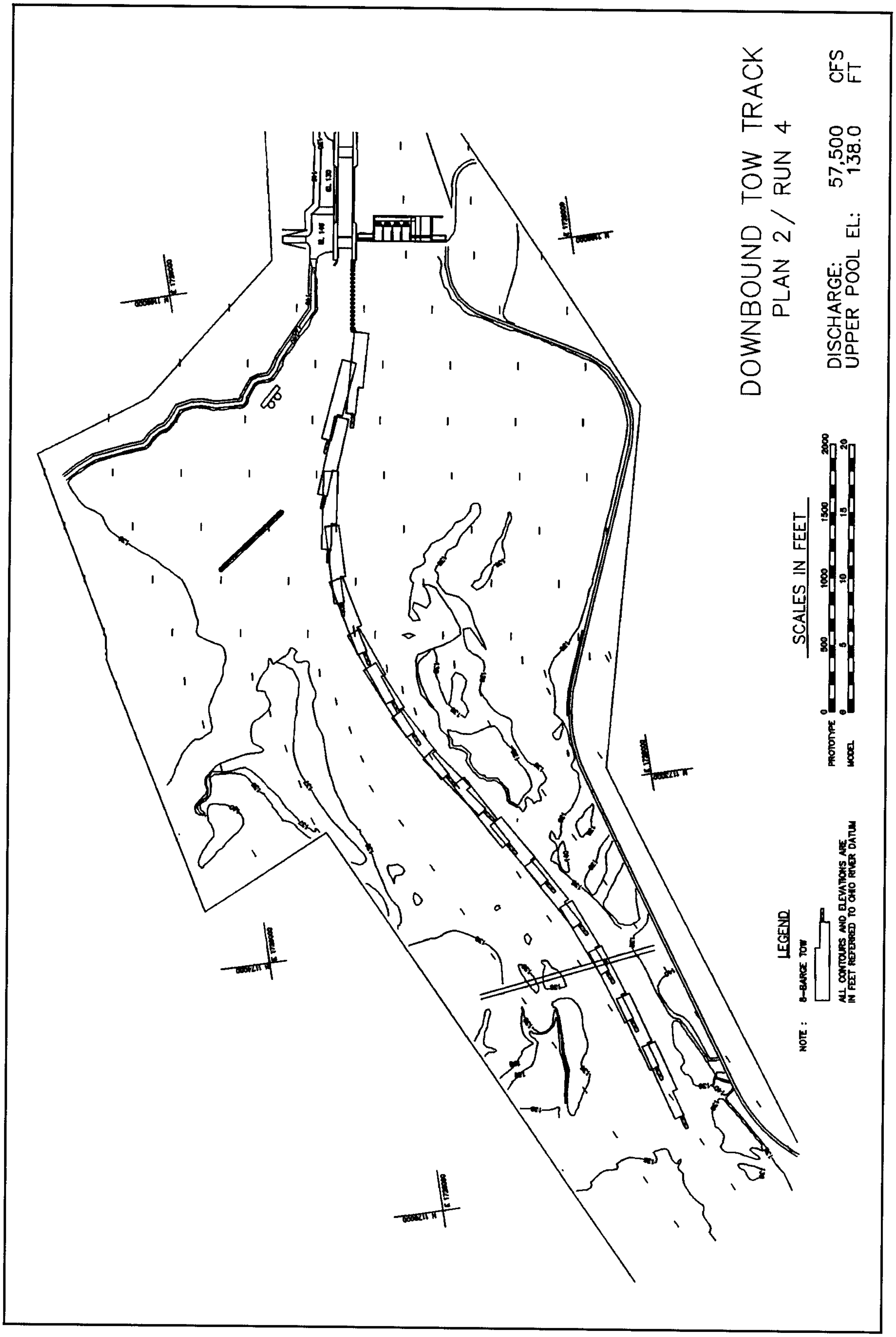
MODEL 0 5 10 15 20

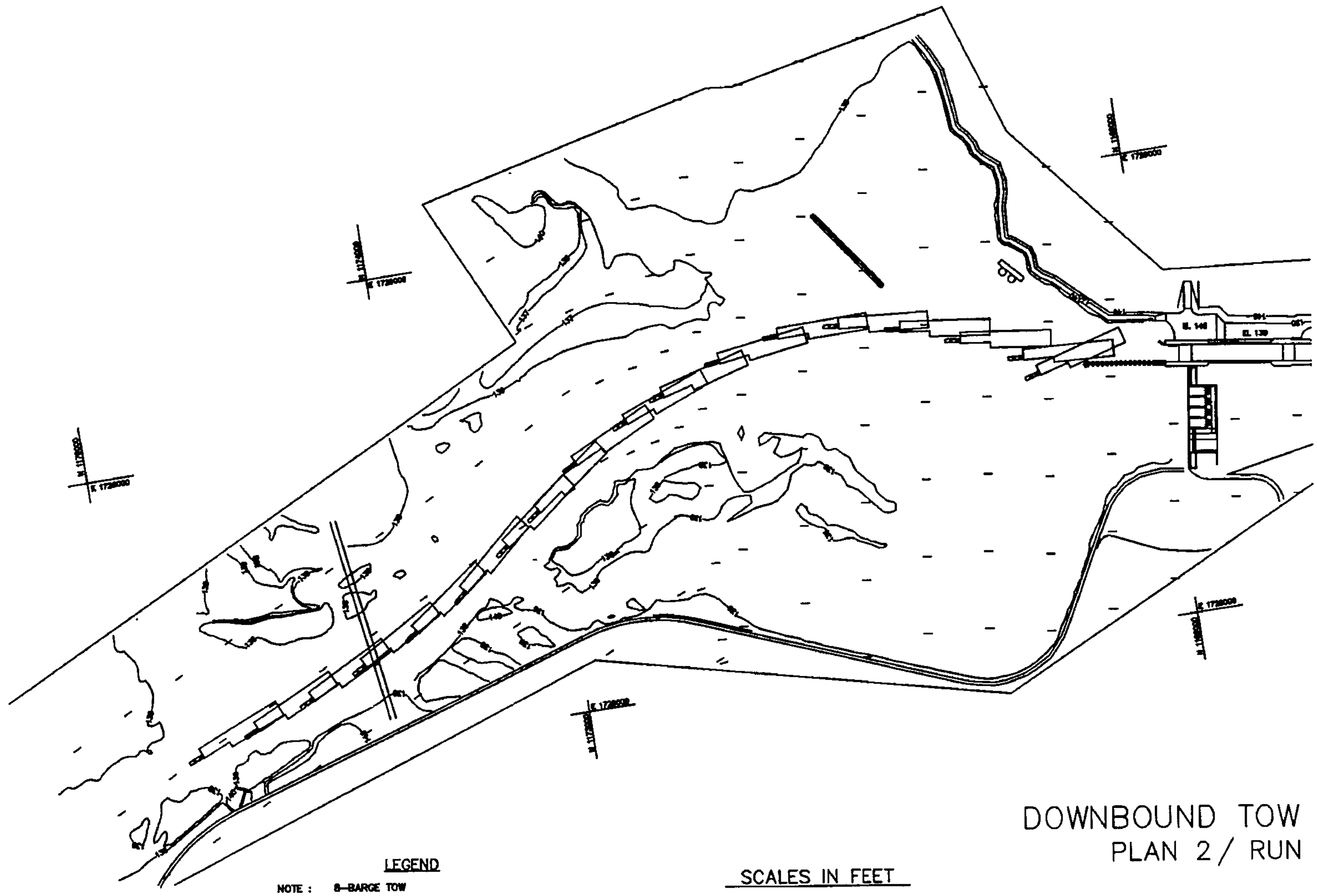
DISCHARGE:	57,500	CFS
UPPER POOL EL:	138.0	FT



DOWNBOUND TOW TRACK
PLAN 2 / RUN 2
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
EL 140
EL 130


DOWNBOUND TOW TRACK
PLAN 2 / RUN 3
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE: ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
PLAN 2 / RUN 4
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE: ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

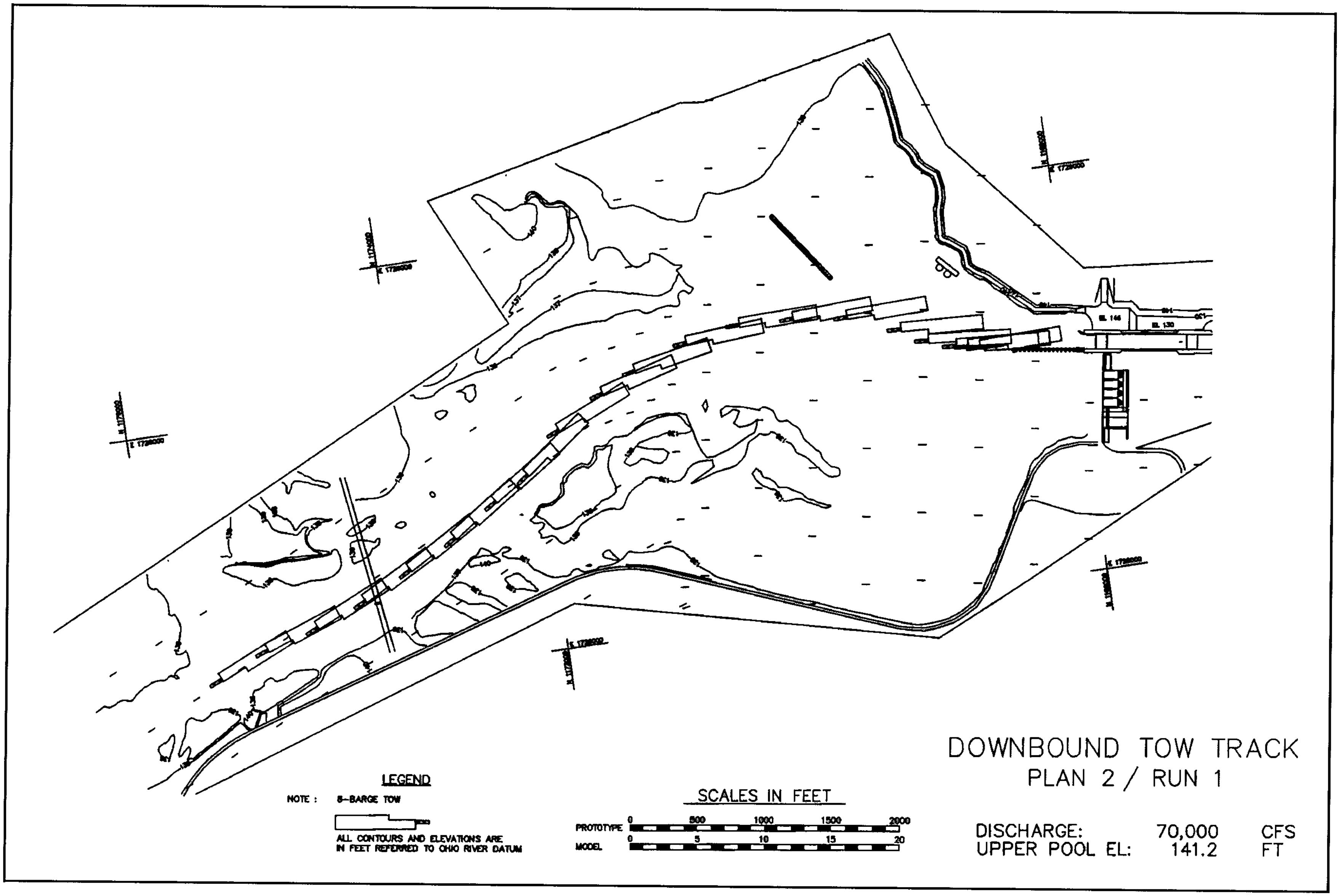
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

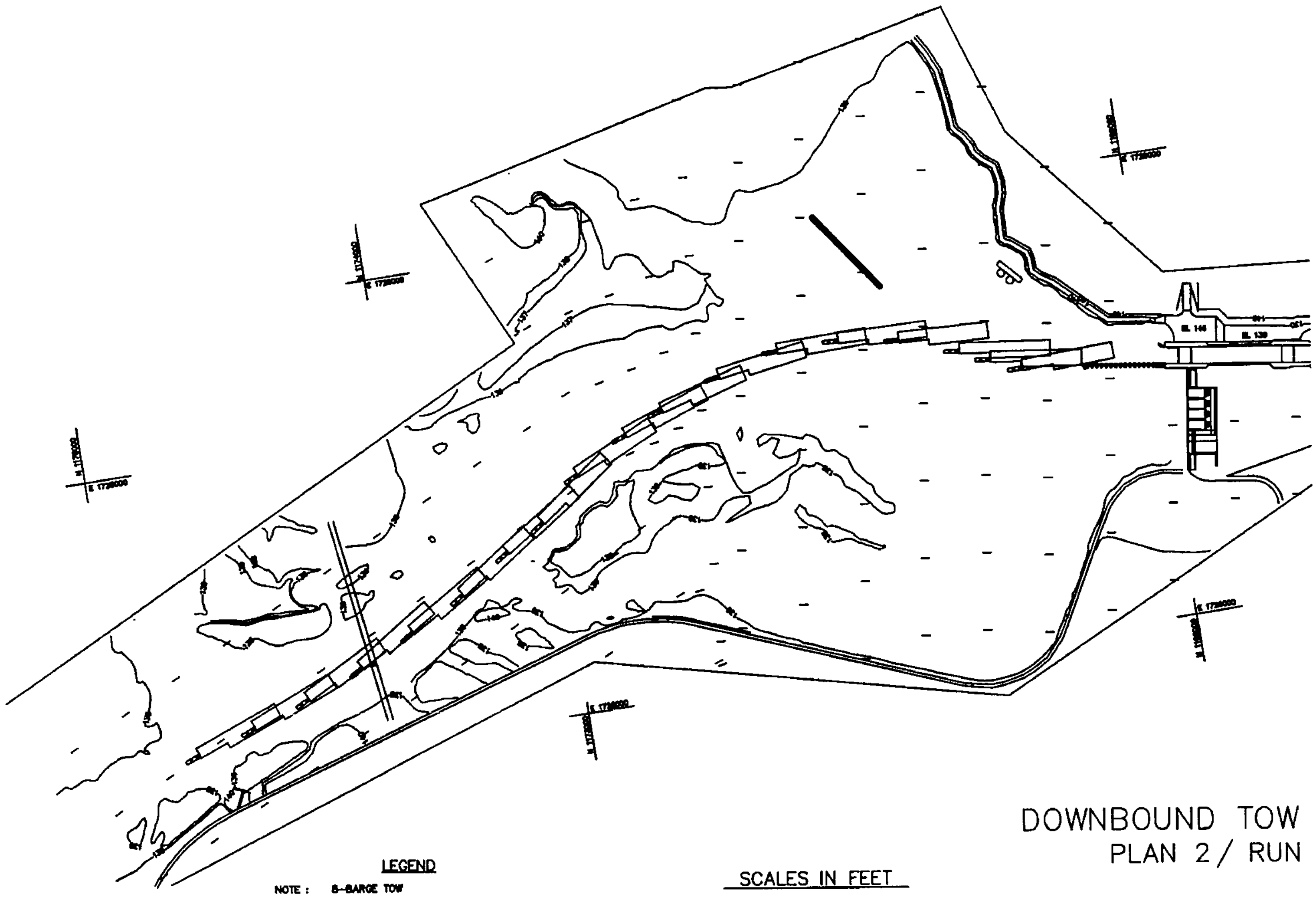
MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
PLAN 2/ RUN 5

DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT



DOWNBOUND TOW TRACK
PLAN 2 / RUN 1
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
EL 146
EL 130



LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

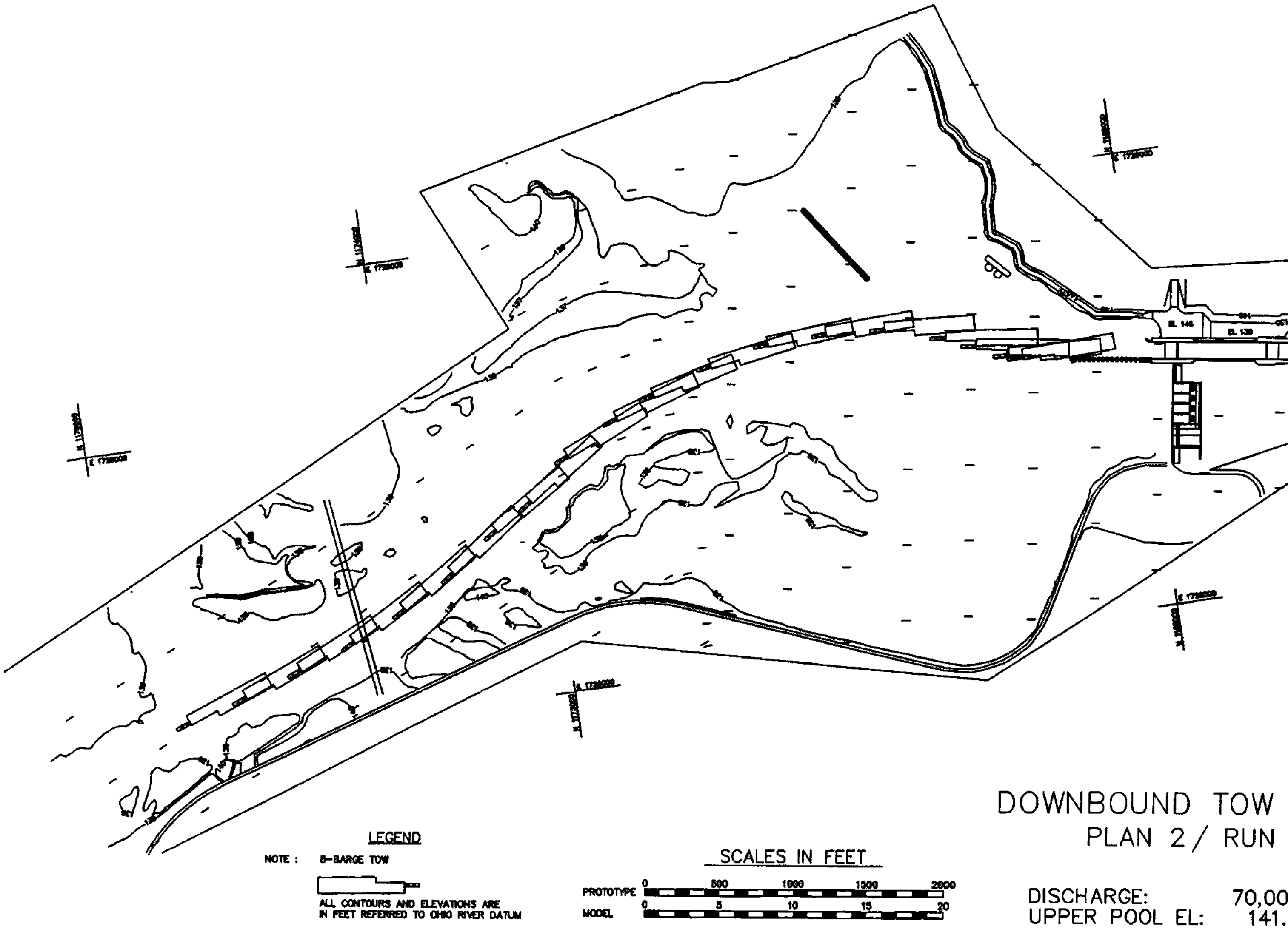
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

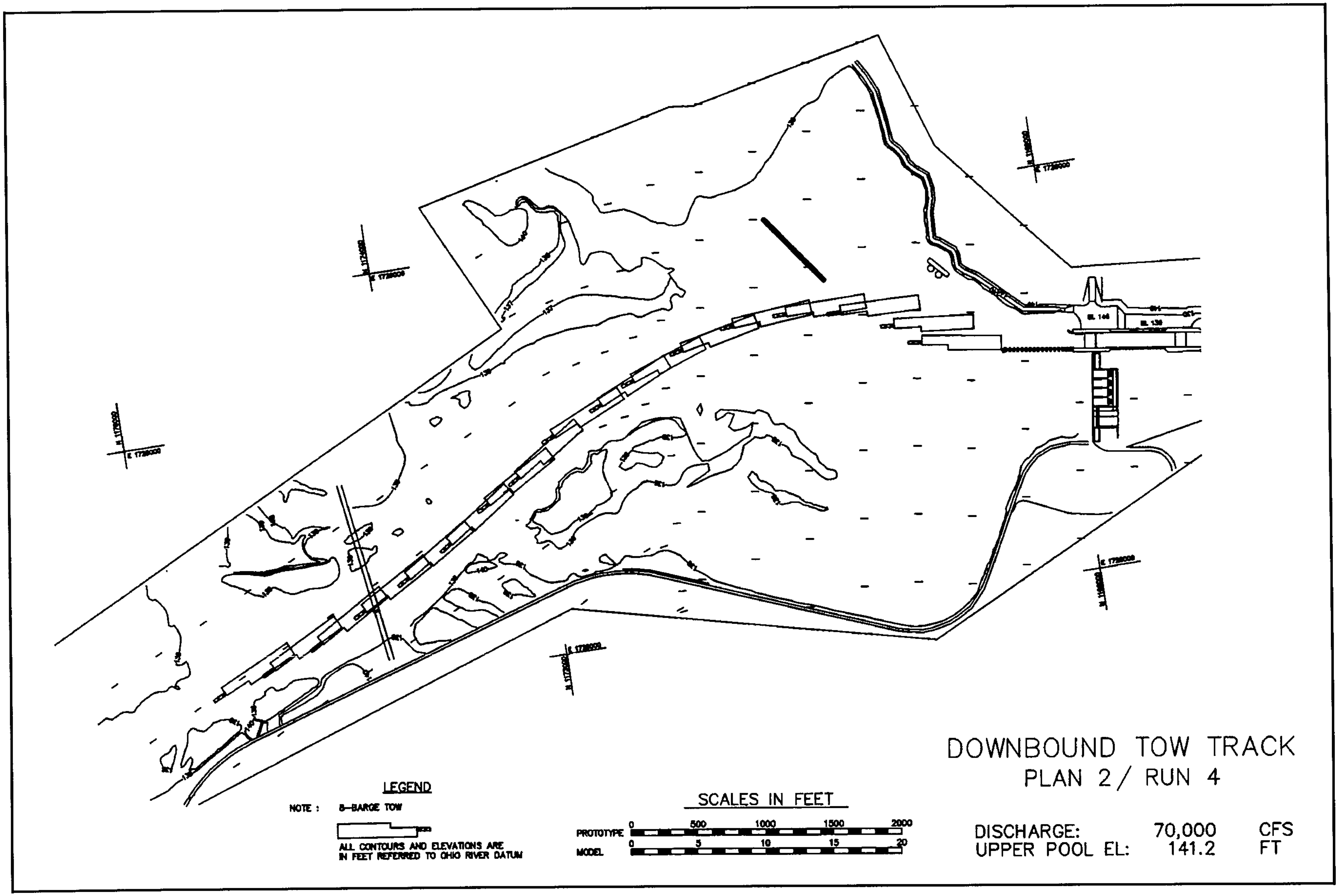
DOWNBOUND TOW TRACK
PLAN 2 / RUN 2

DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT

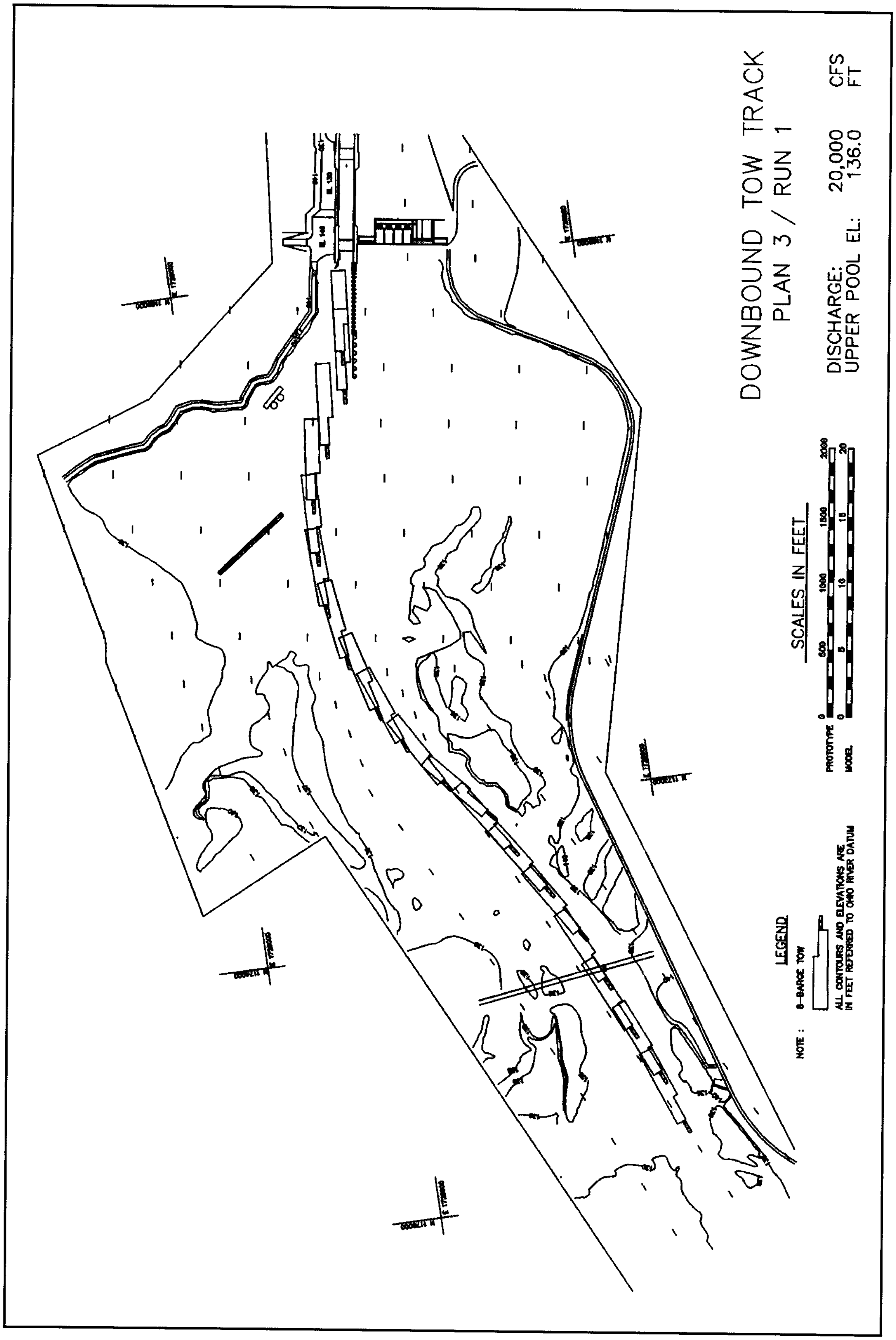


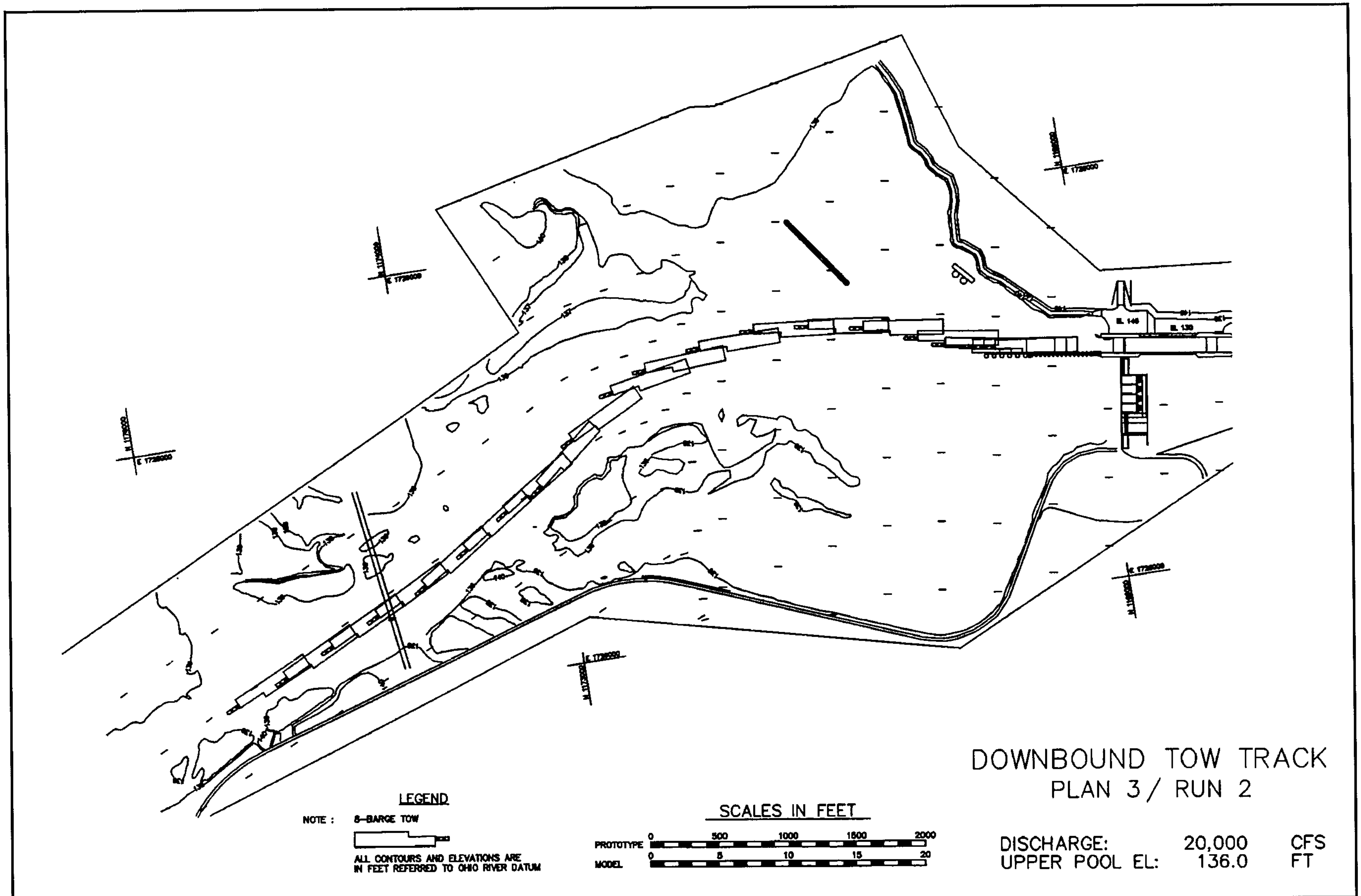
DOWNBOUND TOW TRACK
PLAN 2 / RUN 3

DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT



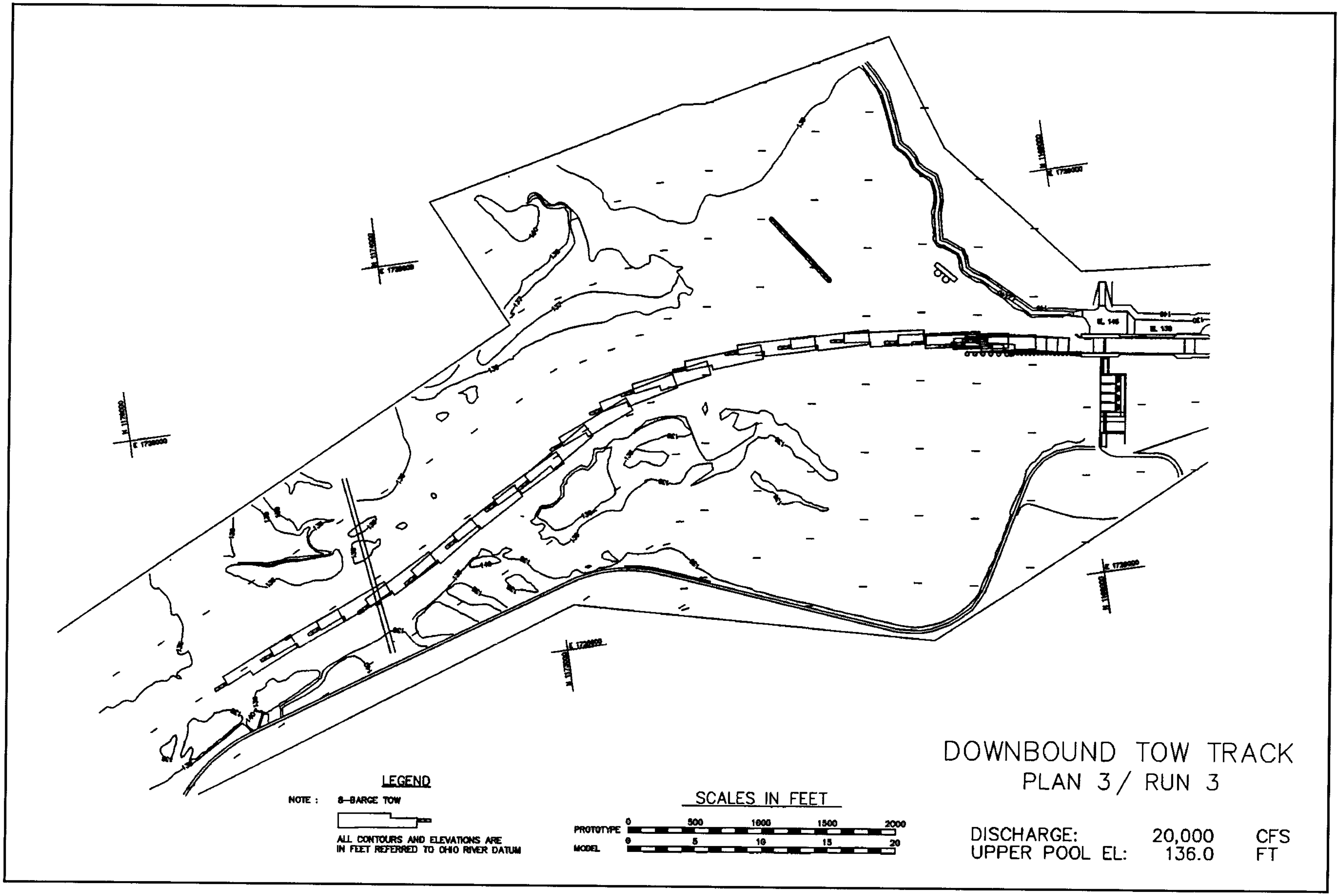
DOWNBOUND TOW TRACK
PLAN 2 / RUN 4
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20

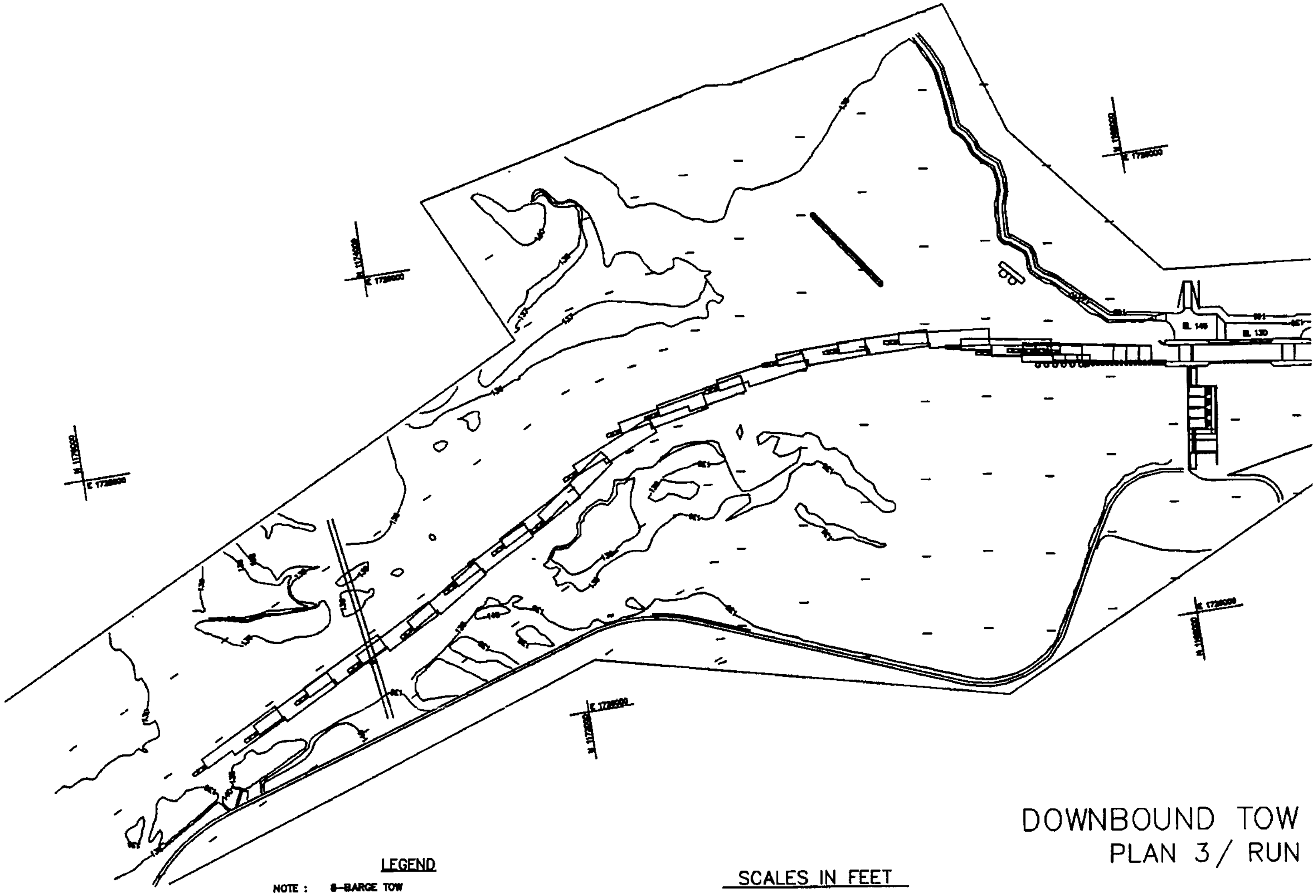

DOWNBOUND TOW TRACK
PLAN 3 / RUN 1
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE: 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 3 / RUN 2

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT


DOWNBOUND TOW TRACK
PLAN 3 / RUN 3
DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



DOWNBOUND TOW TRACK
PLAN 3 / RUN 4

LEGEND

NOTE : 8–BARGE TOW

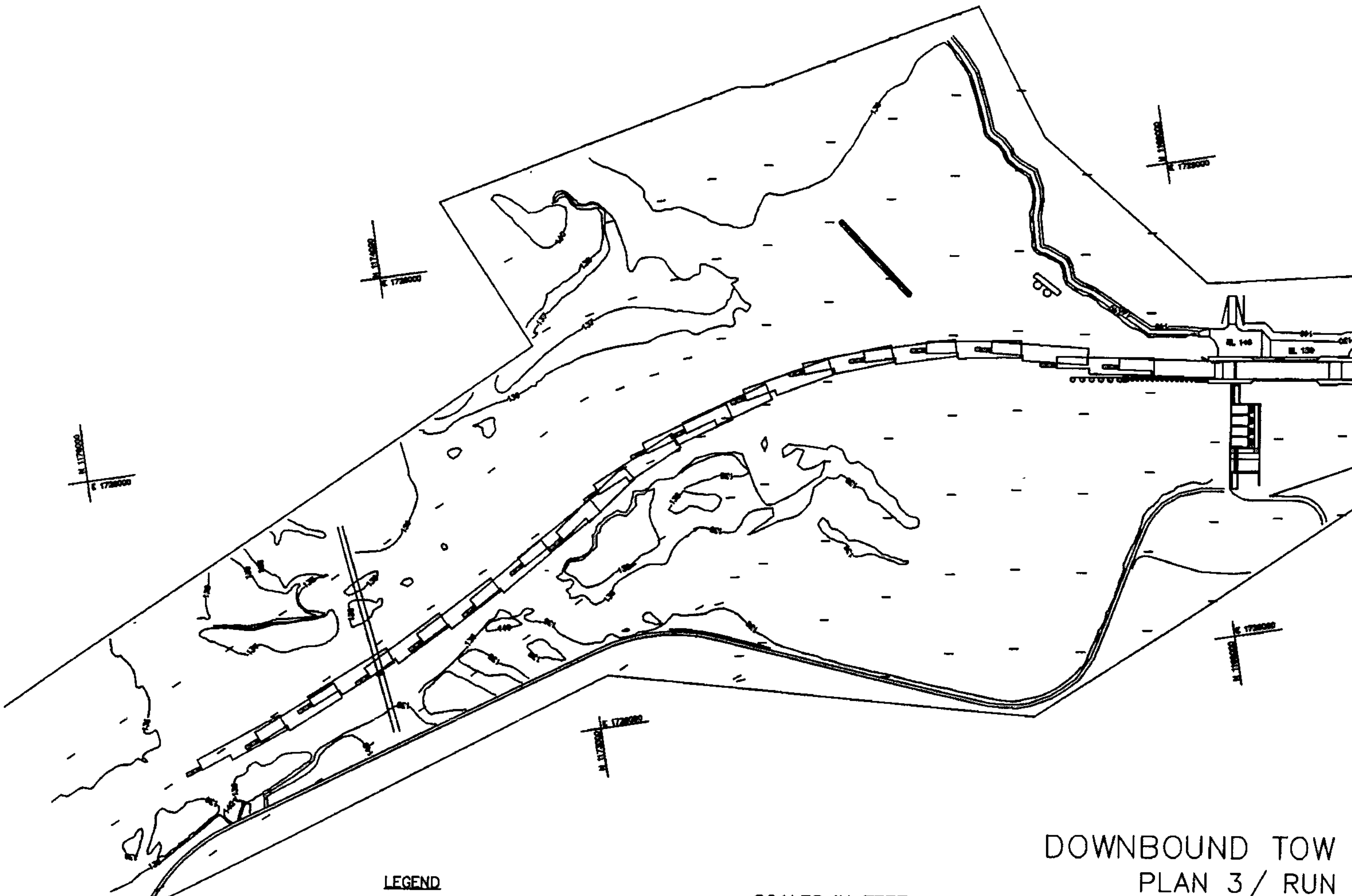
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT



DOWNBOUND TOW TRACK
PLAN 3/ RUN 5

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT

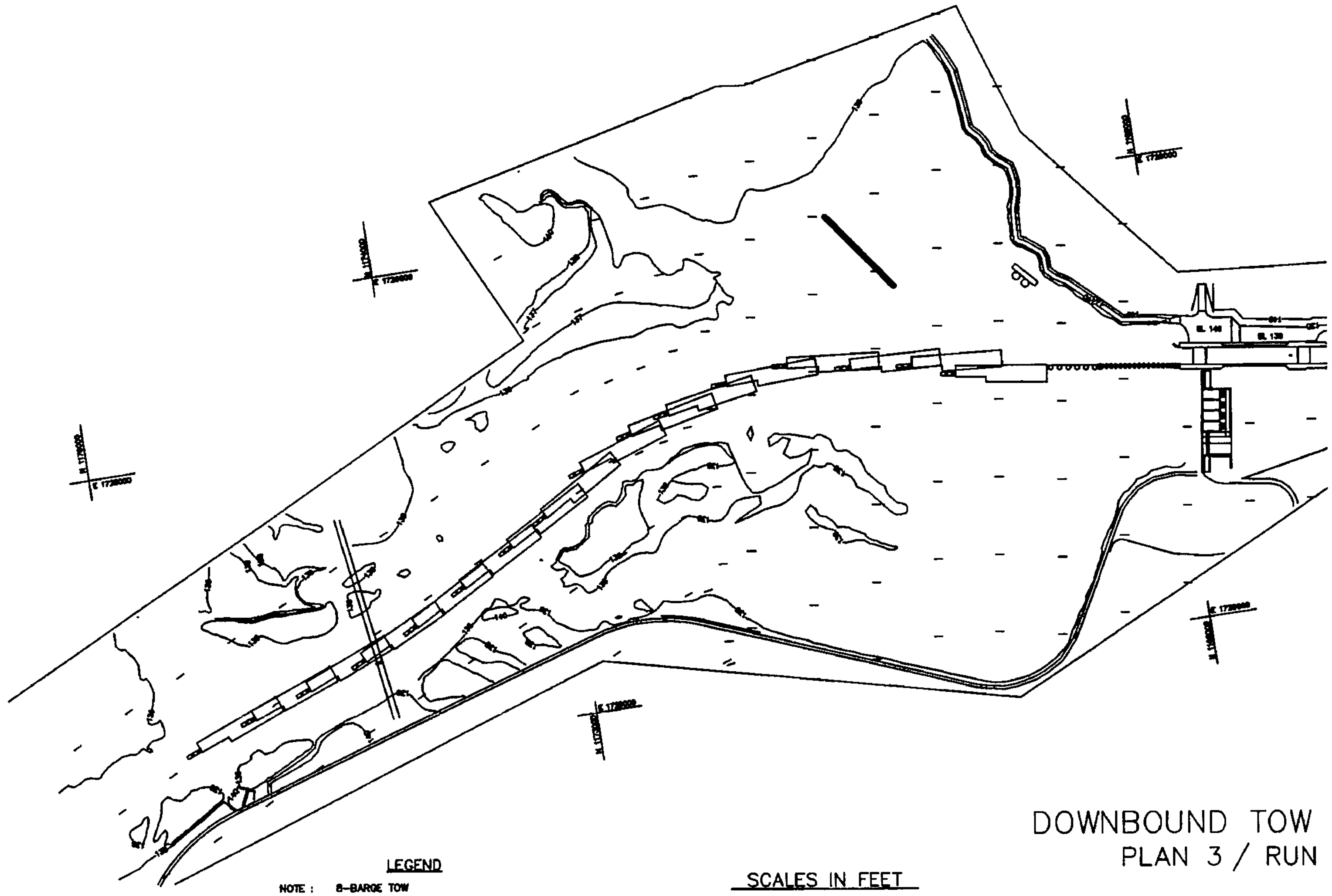
LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

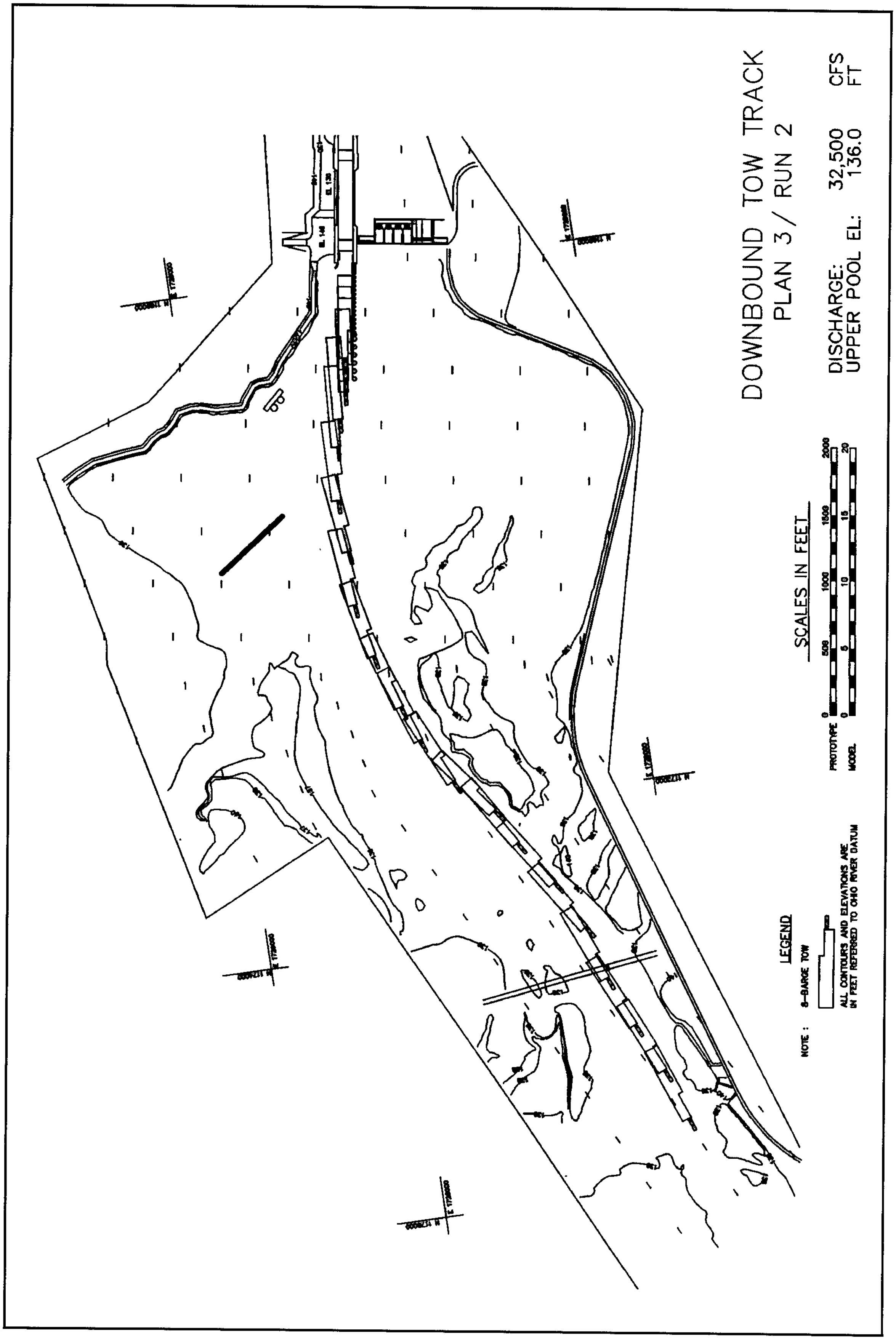
SCALES IN FEET

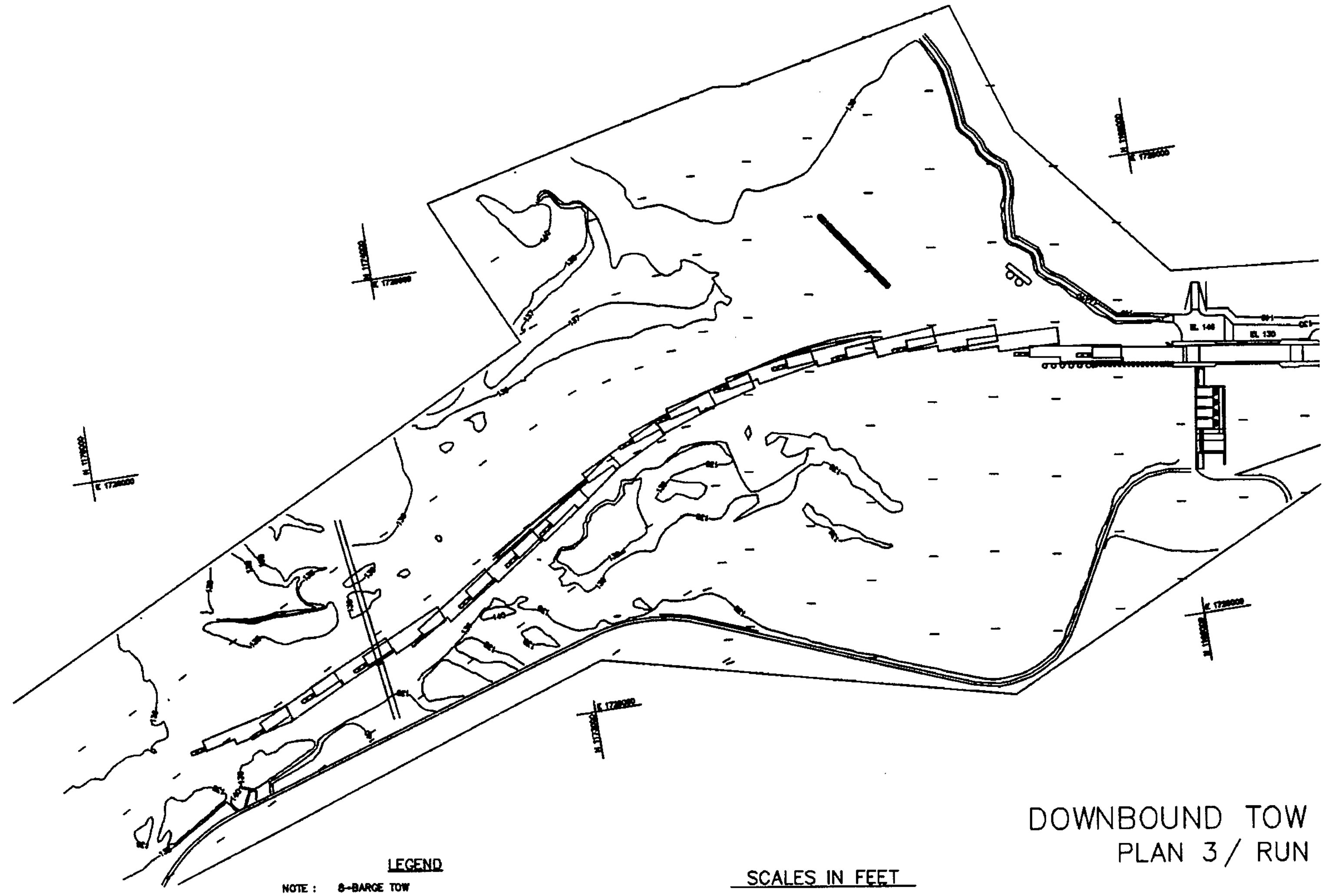
PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
PLAN 3 / RUN 1

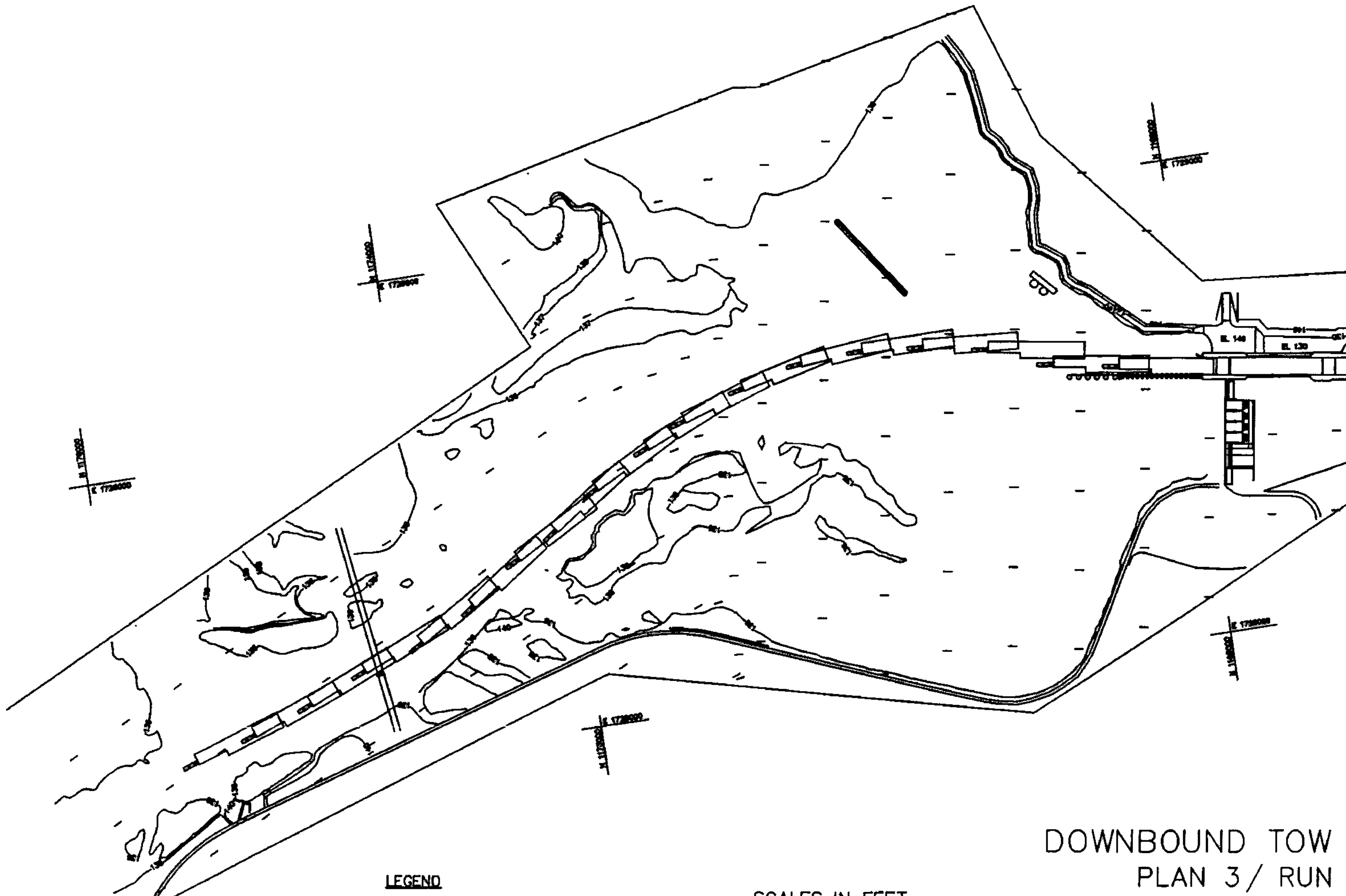
DISCHARGE:	32,500	CFS
UPPER POOL EL:	136.0	FT


DOWNBOUND TOW TRACK
PLAN 3/ RUN 2
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 3 / RUN 3

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT



LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

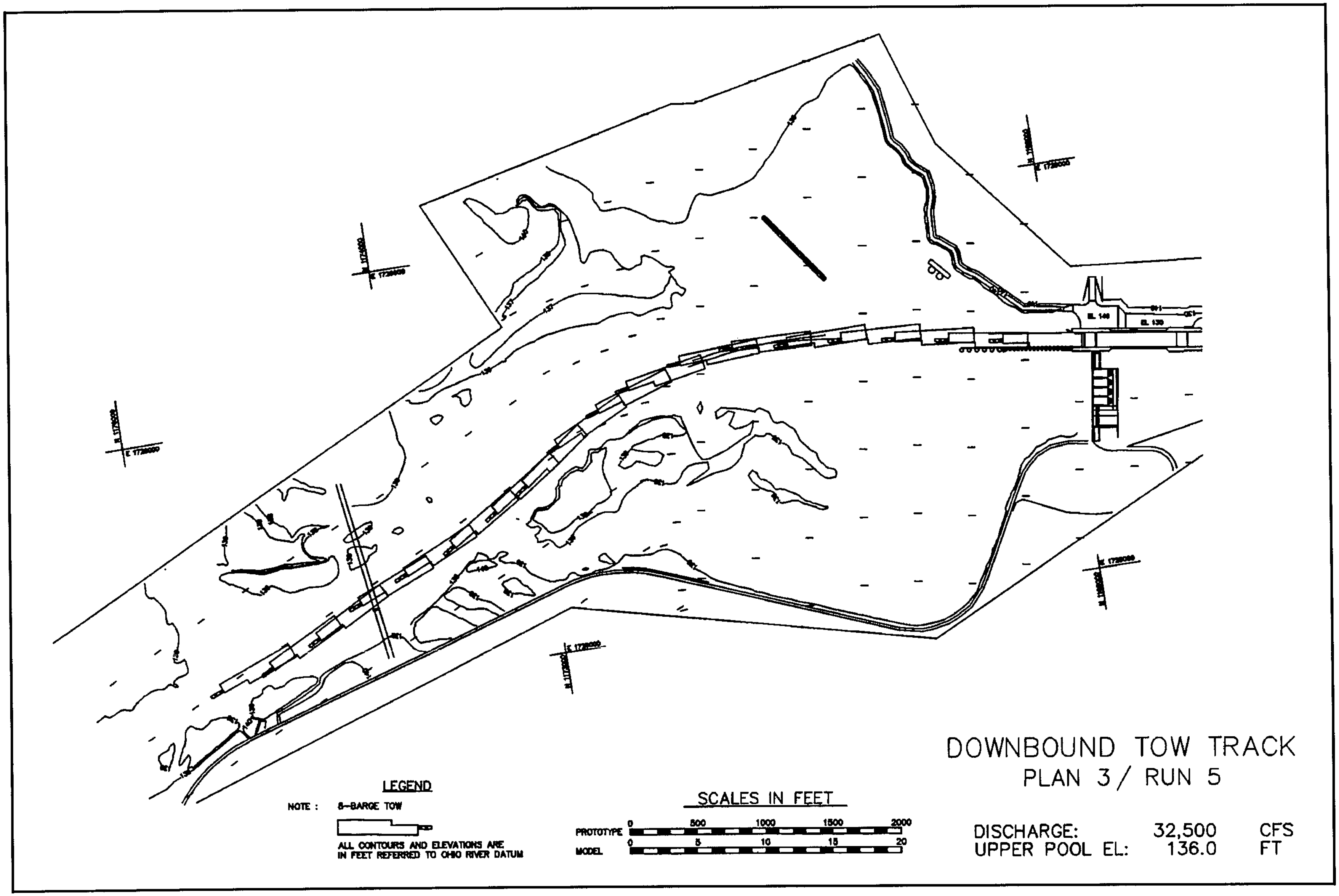
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

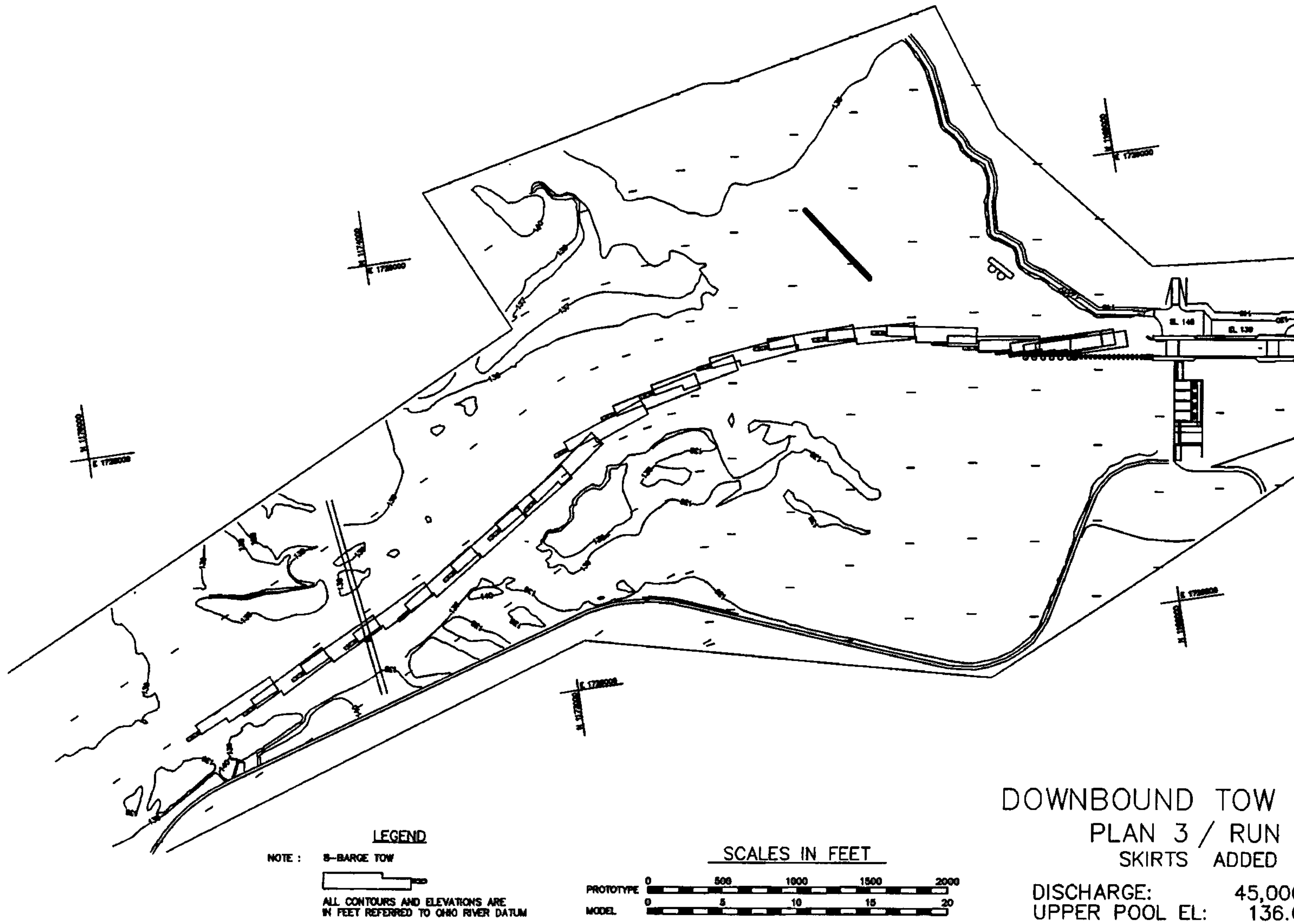
MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
PLAN 3/ RUN 4

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT

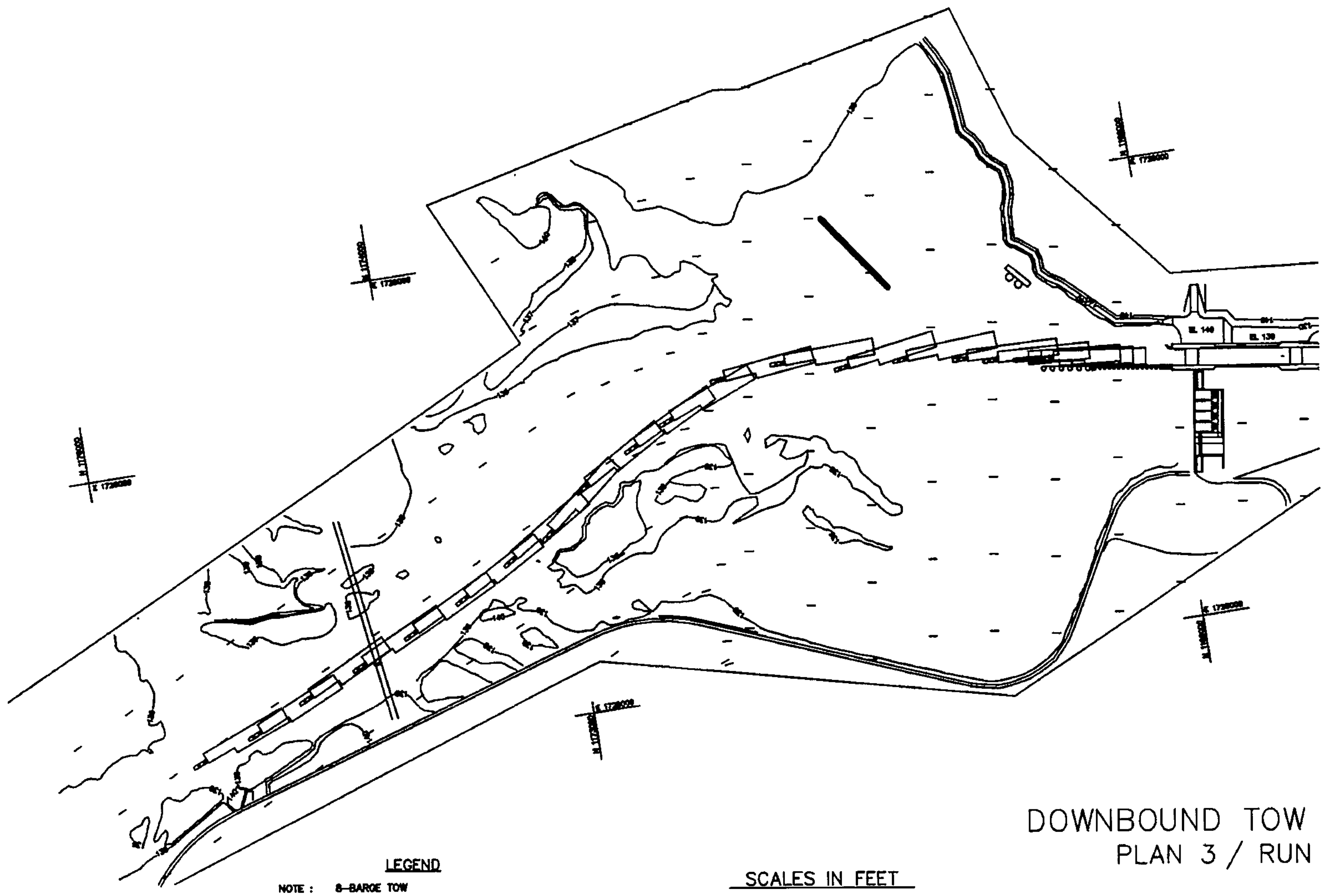


DOWNBOUND TOW TRACK
PLAN 3 / RUN 5
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



DOWNBOUND TOW TRACK
PLAN 3 / RUN 1
SKIRTS ADDED

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT



DOWNBOUND TOW TRACK
PLAN 3 / RUN 1

LEGEND

NOTE : 8-BARGE TOW

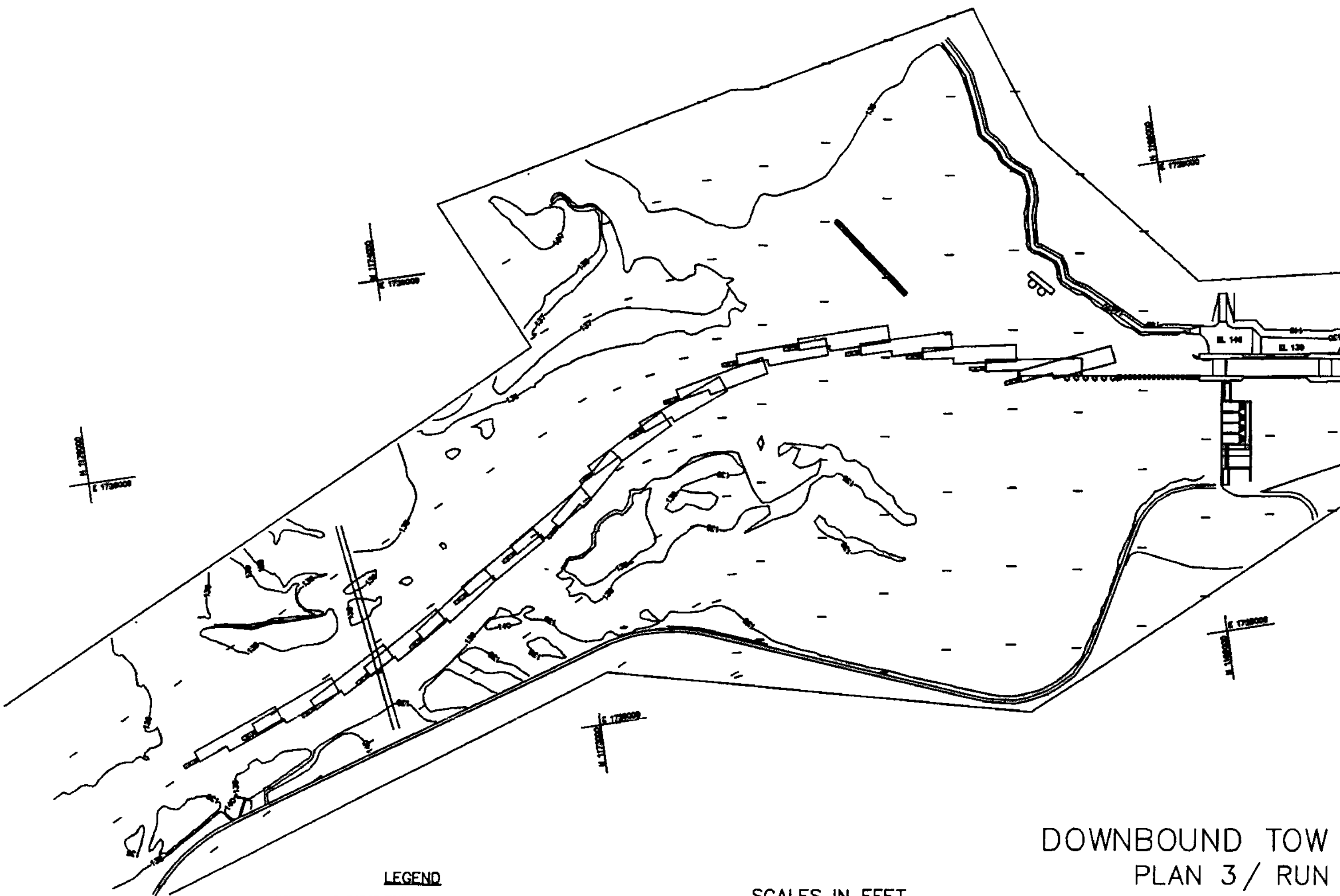
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DISCHARGE:	45,000	CFS
UPPER POOL EL:	136.0	FT



DOWNBOUND TOW TRACK
PLAN 3/ RUN 2

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT

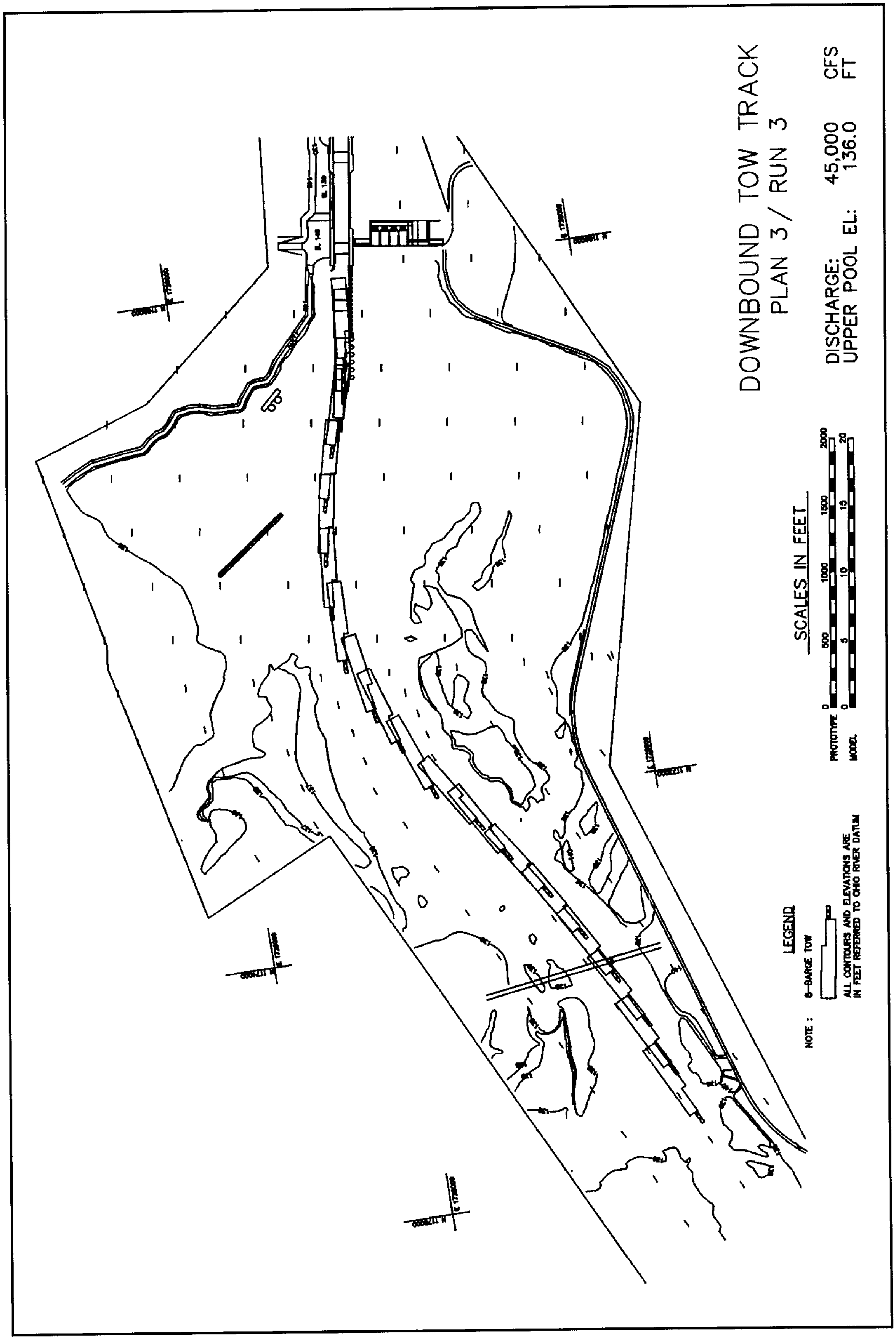
LEGEND

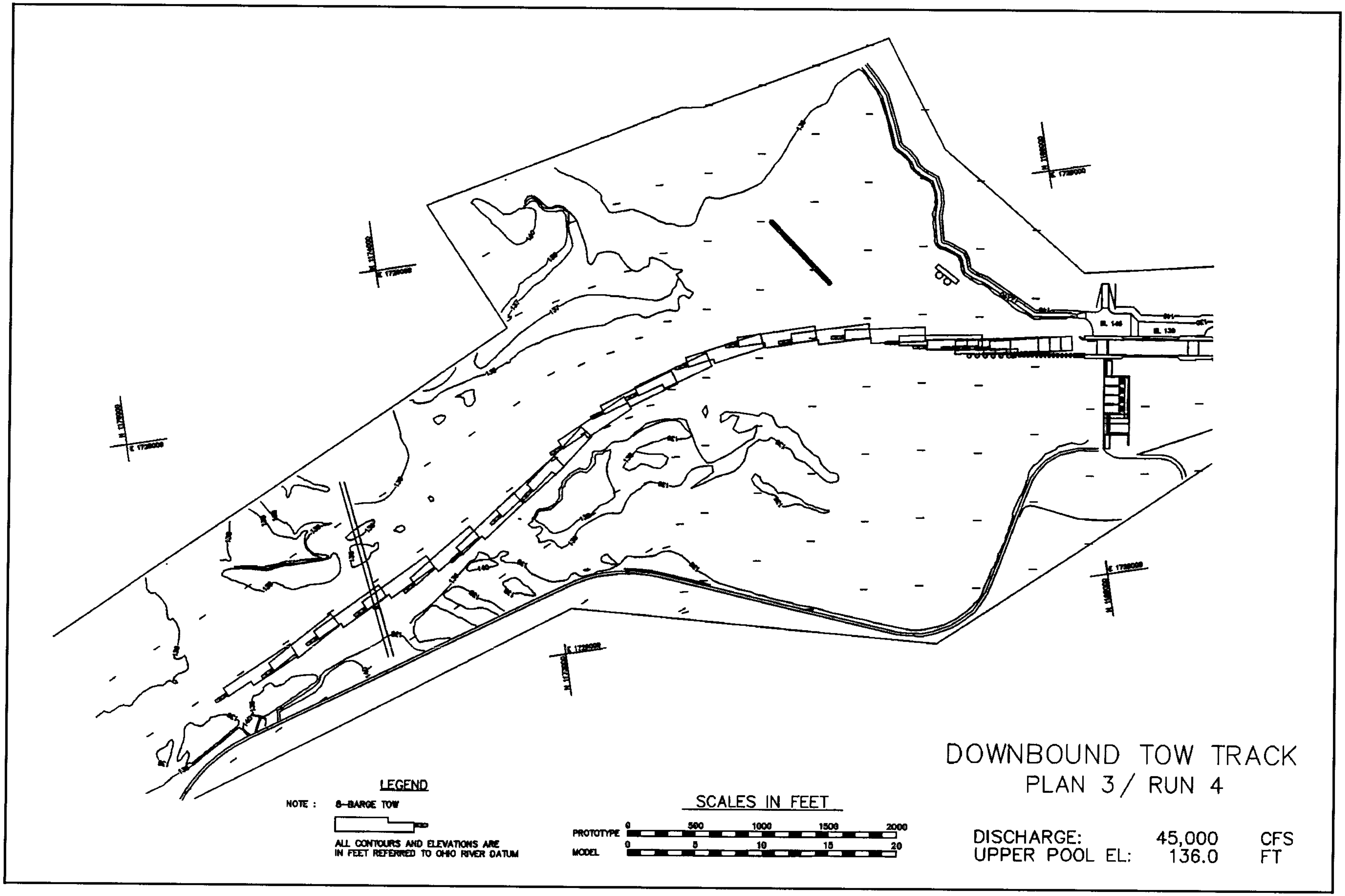
NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

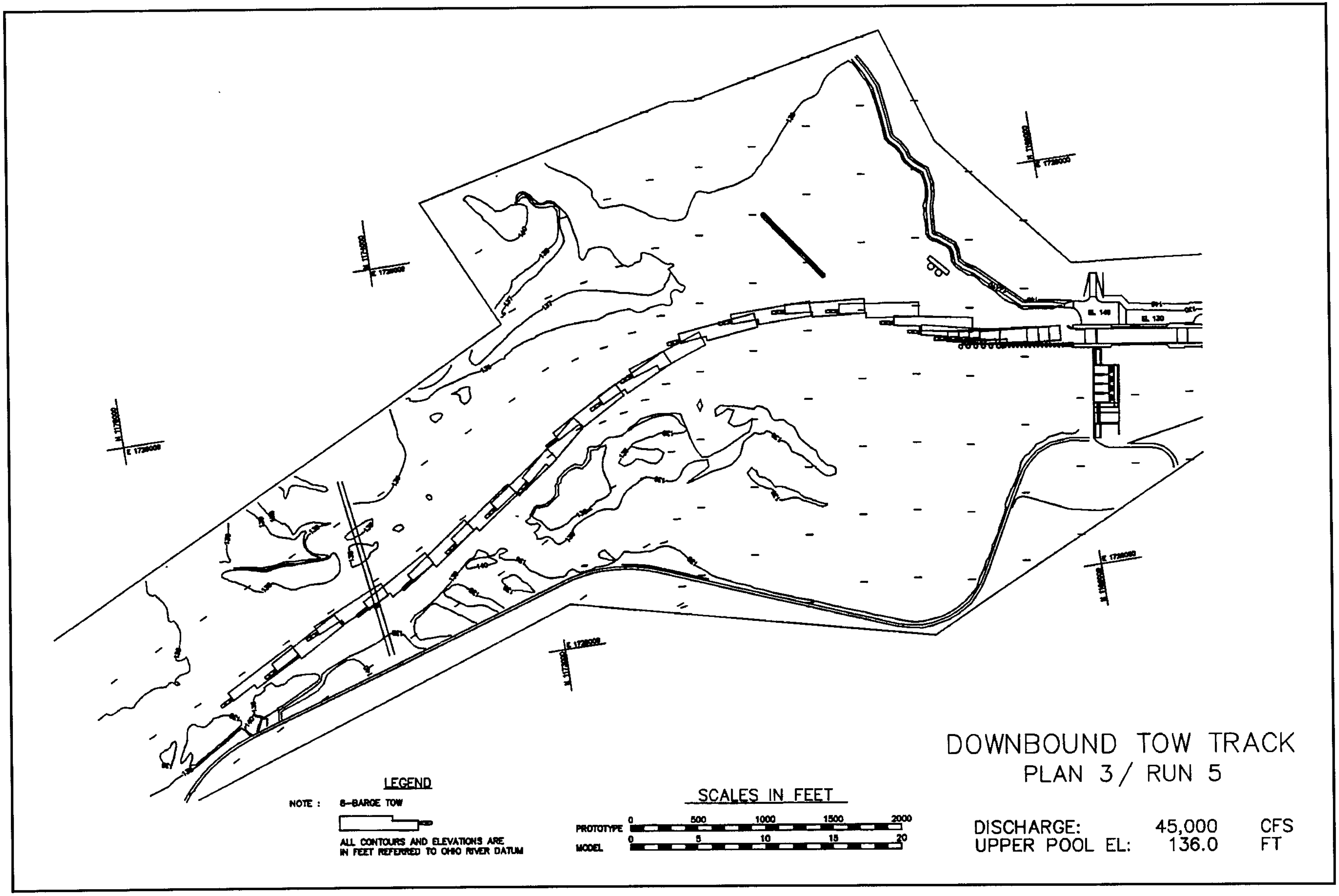
SCALES IN FEET

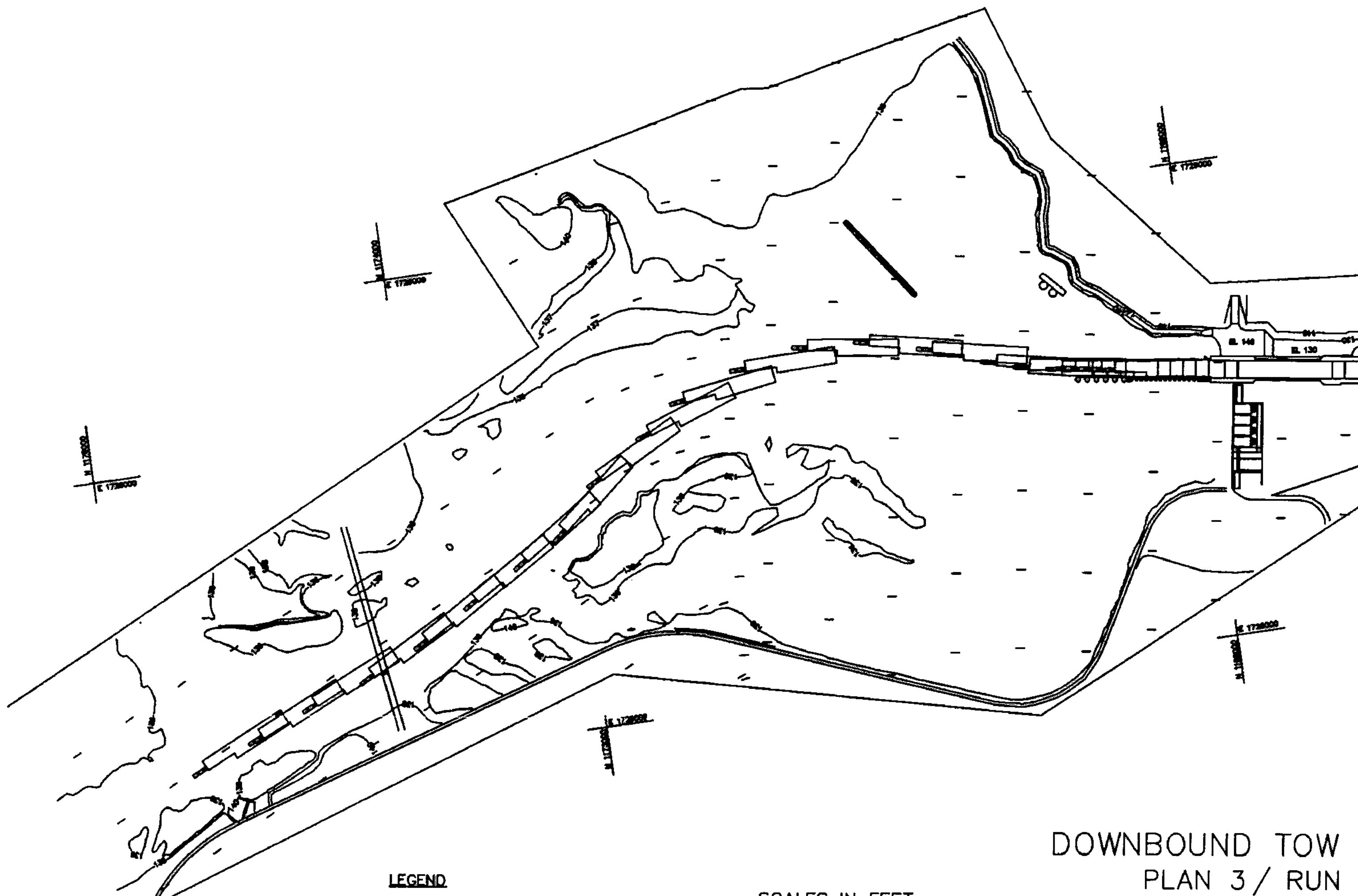
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
PLAN 3 / RUN 3
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE : ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 3/ RUN 4
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20


EL 146
EL 130
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
DOWNBOUND TOW TRACK
PLAN 3 / RUN 5
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT



LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE
IN FEET REFERRED TO OHIO RIVER DATUM

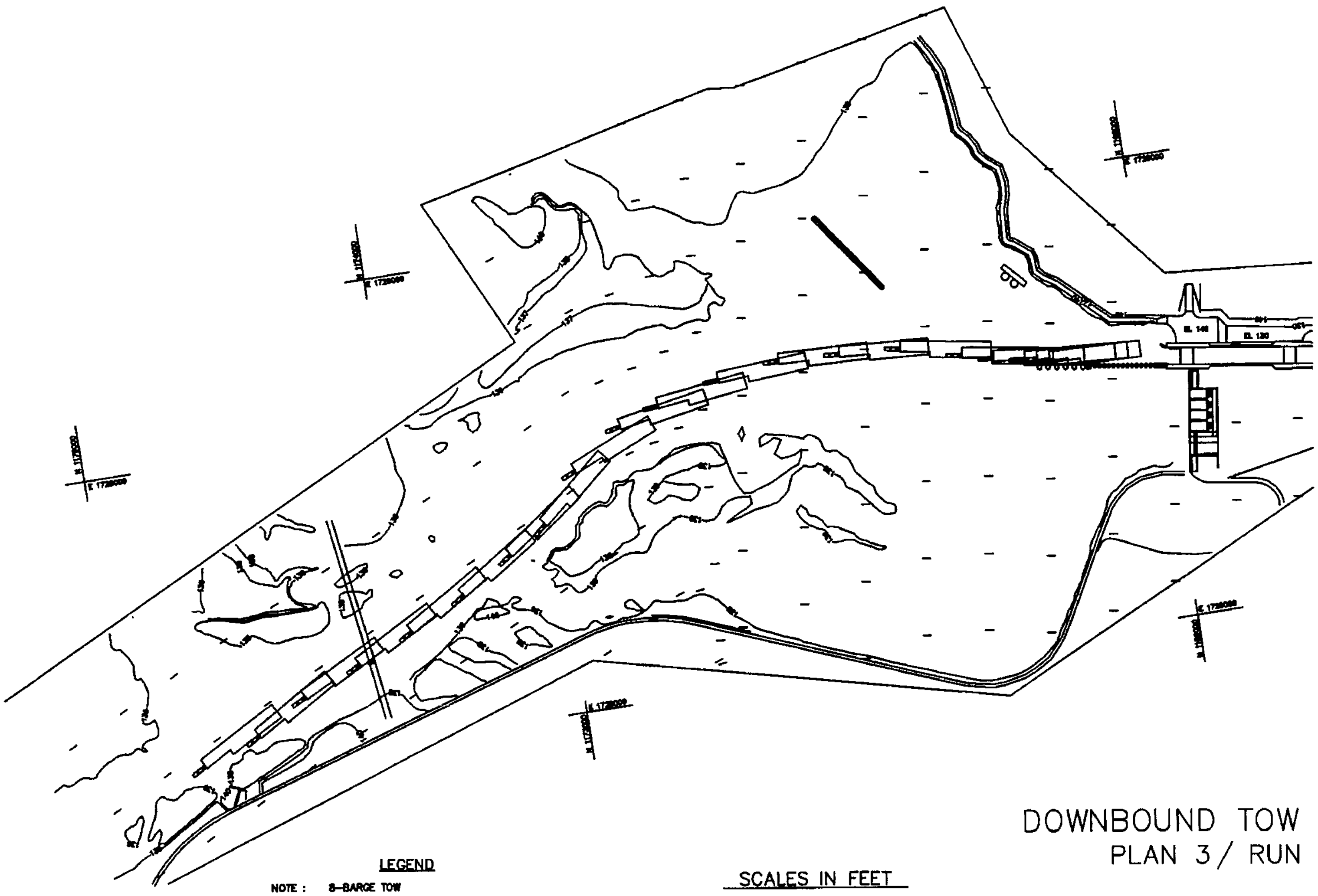
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
PLAN 3 / RUN 6

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT



DOWNBOUND TOW TRACK
PLAN 3 / RUN 7

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT

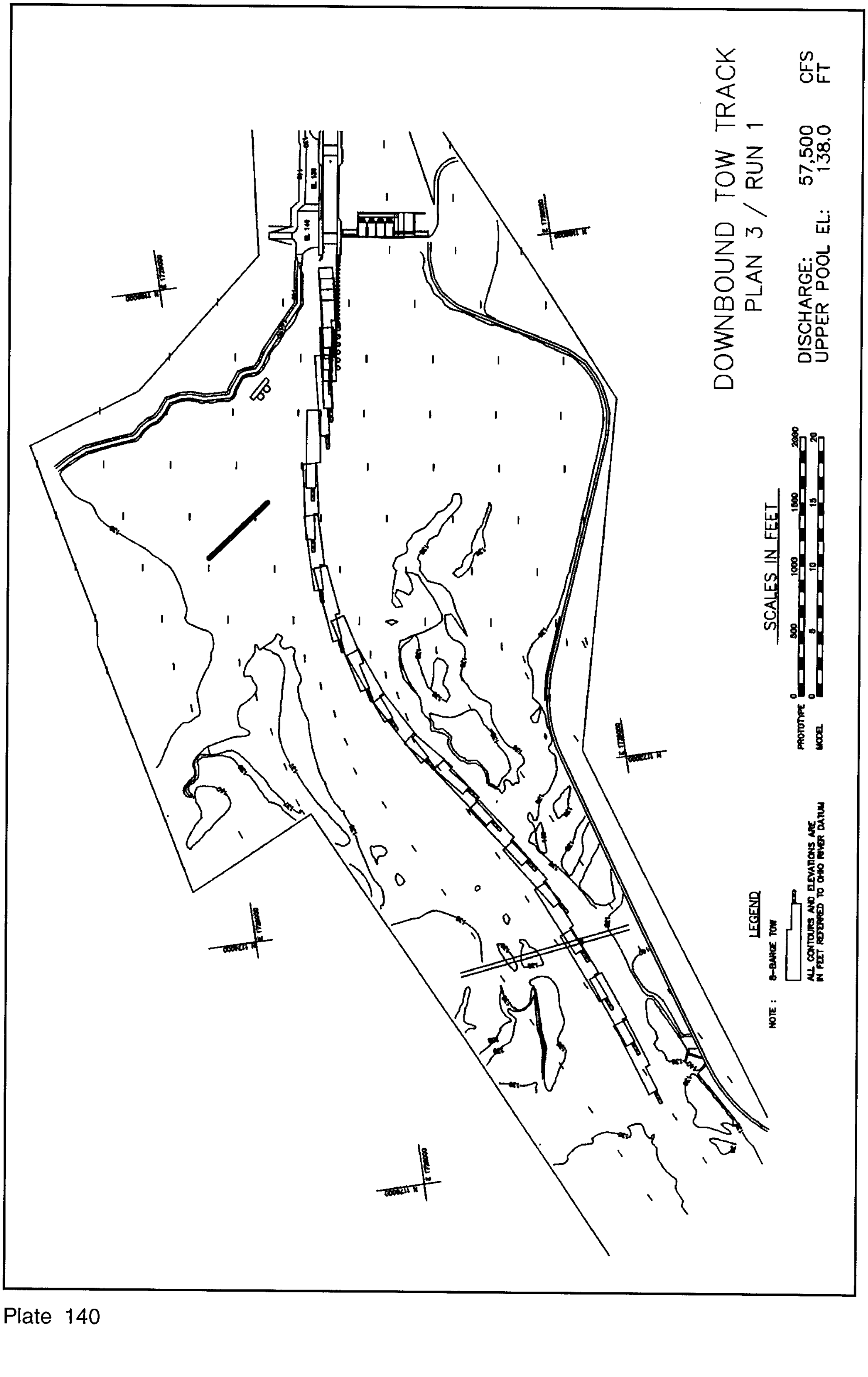
LEGEND

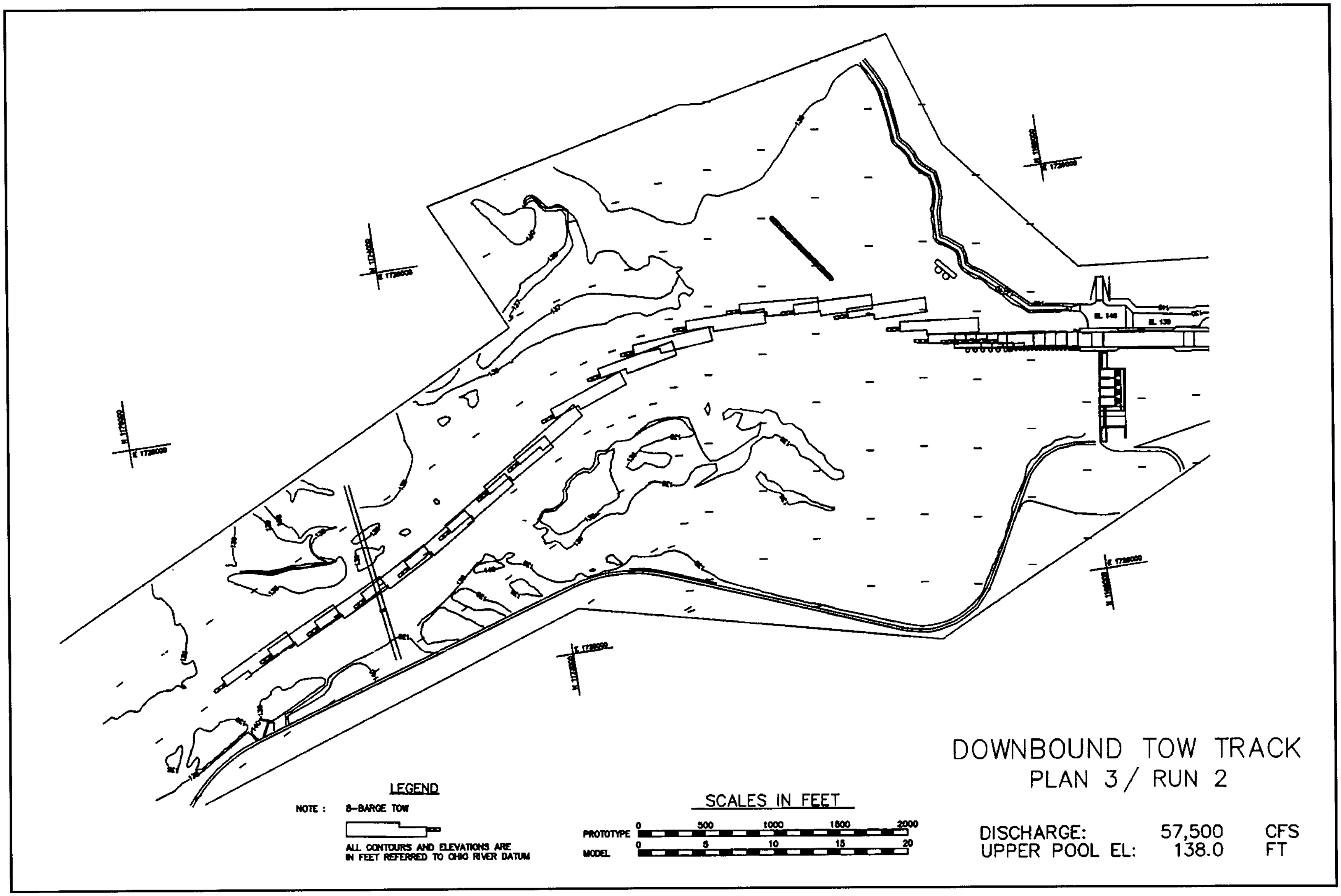
NOTE : 8–BARGE TOW

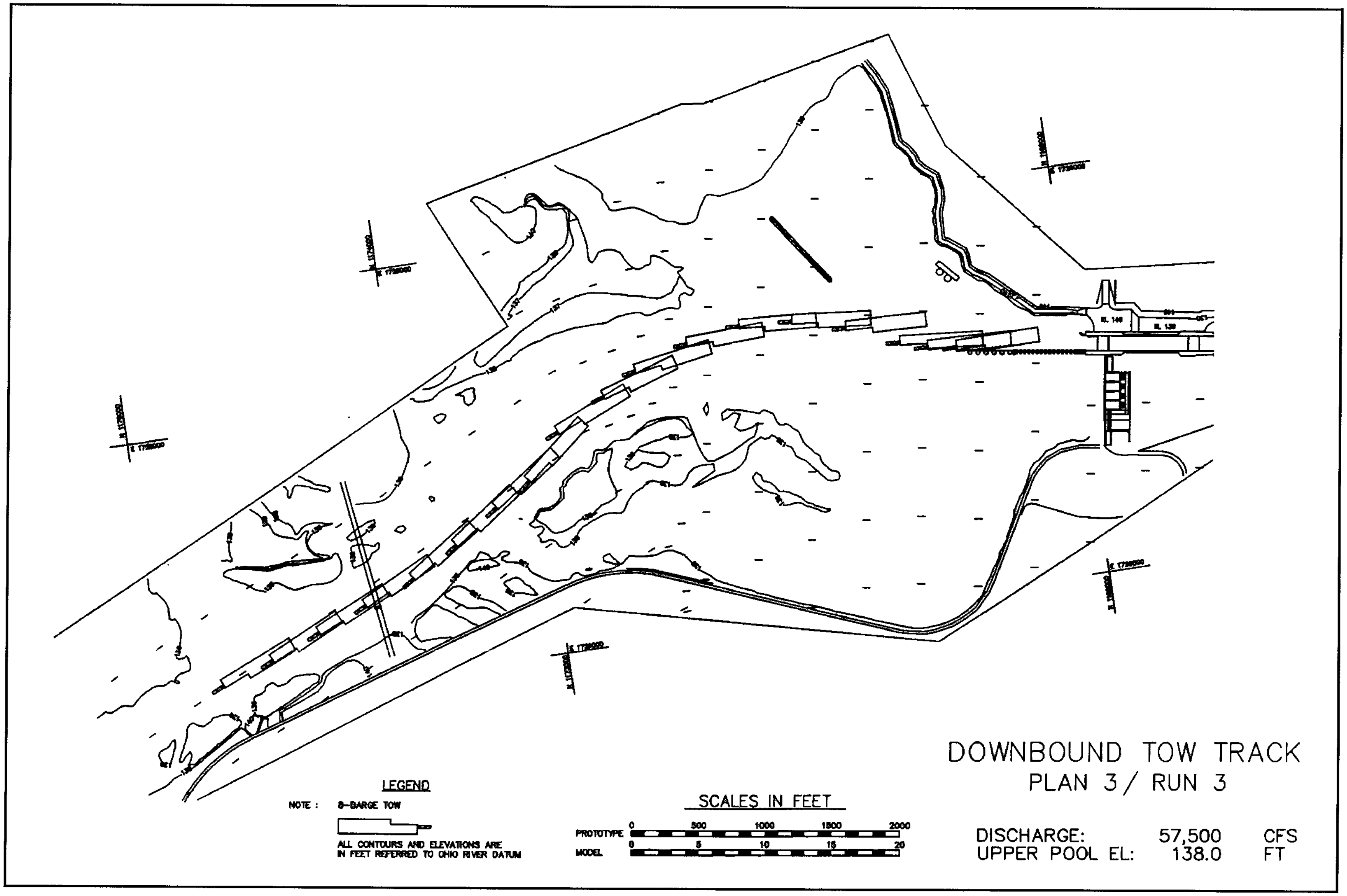
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

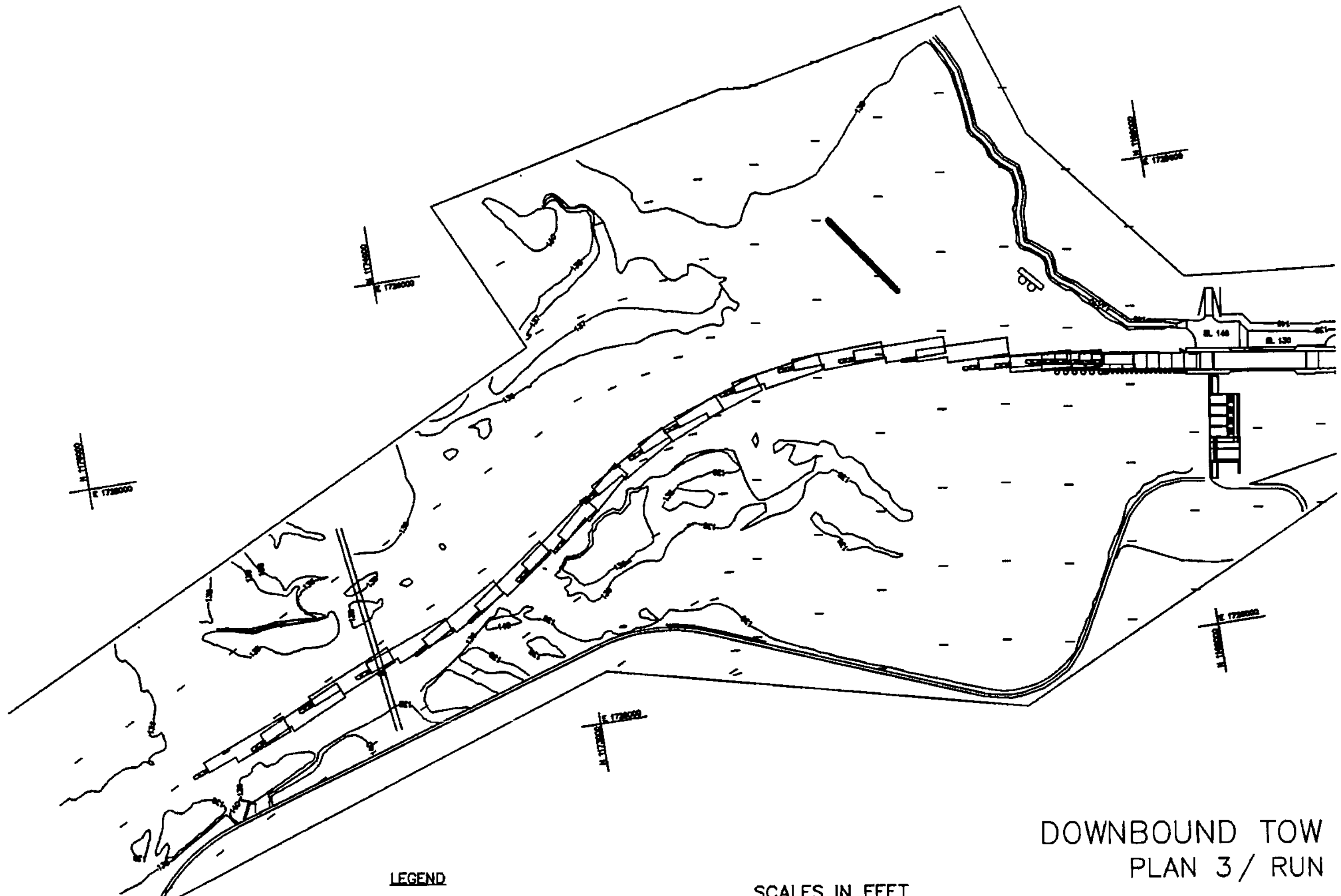
SCALES IN FEET

PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20


DOWNBOUND TOW TRACK
PLAN 3 / RUN 1
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE: ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
PLAN 3 / RUN 2
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM


DOWNBOUND TOW TRACK
PLAN 3 / RUN 3
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 3 / RUN 4

LEGEND

NOTE : 8-BARGE TOW

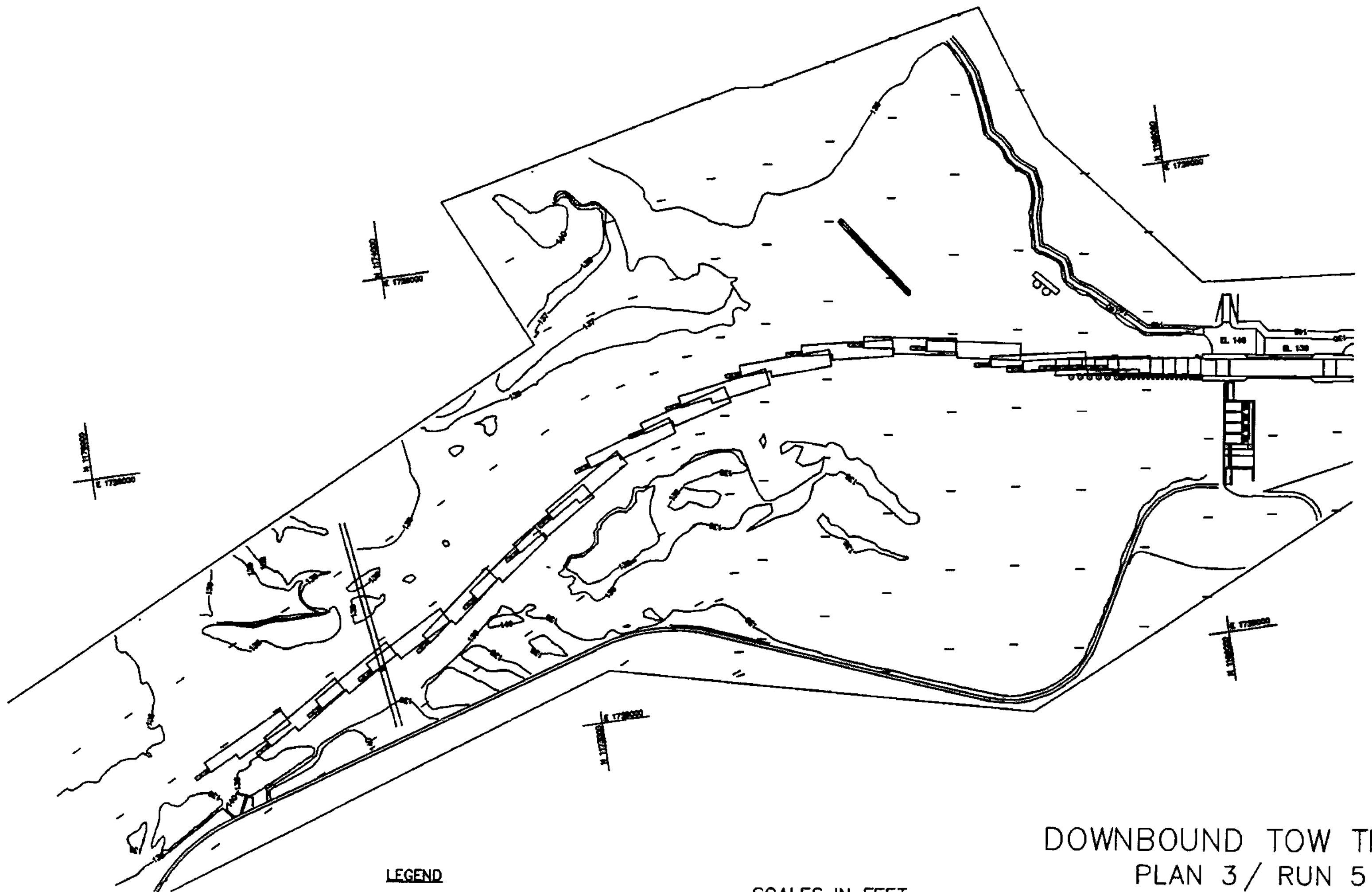
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT



DOWNBOUND TOW TRACK
PLAN 3 / RUN 5

DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT

LEGEND

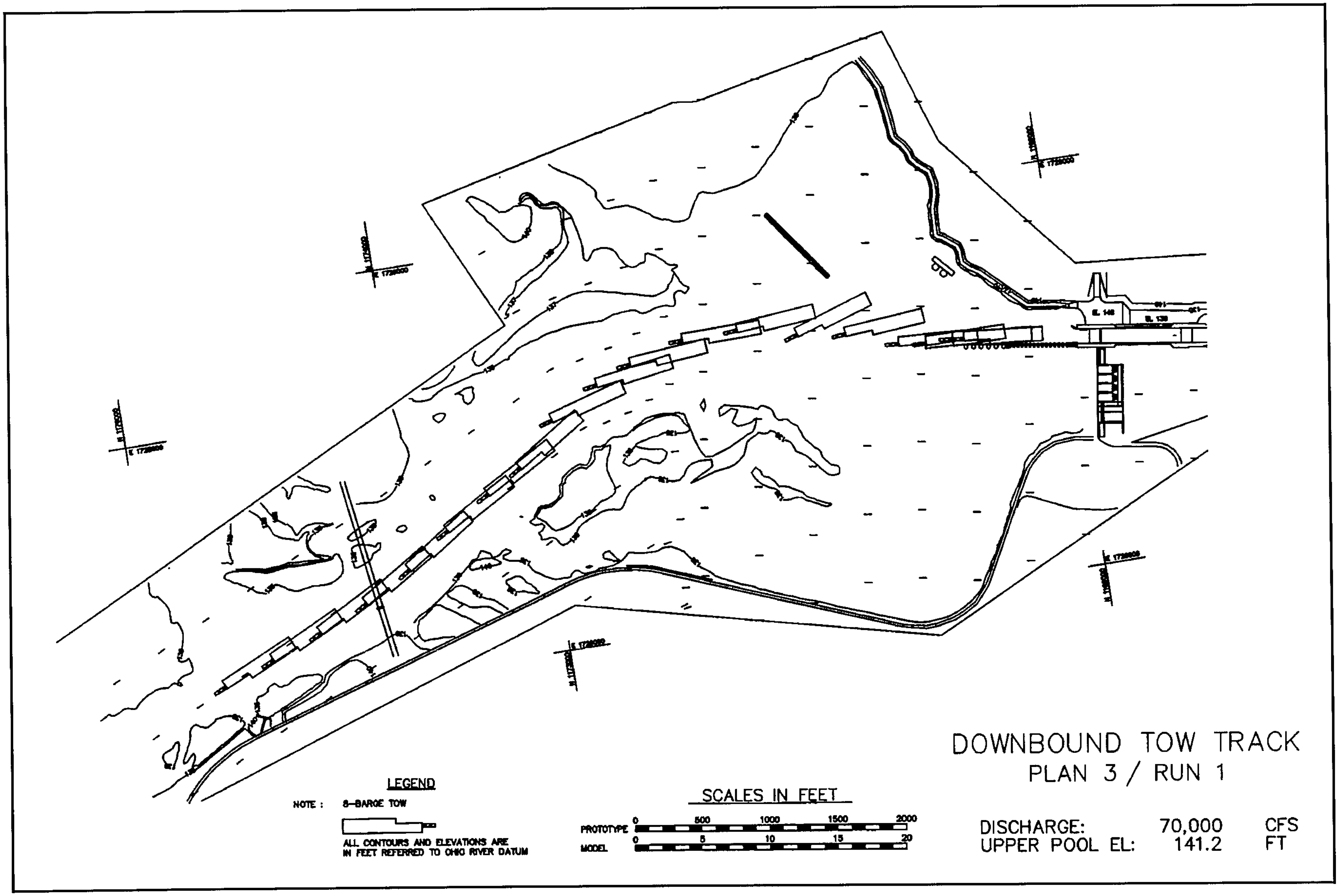
NOTE : 8-BARGE TOW

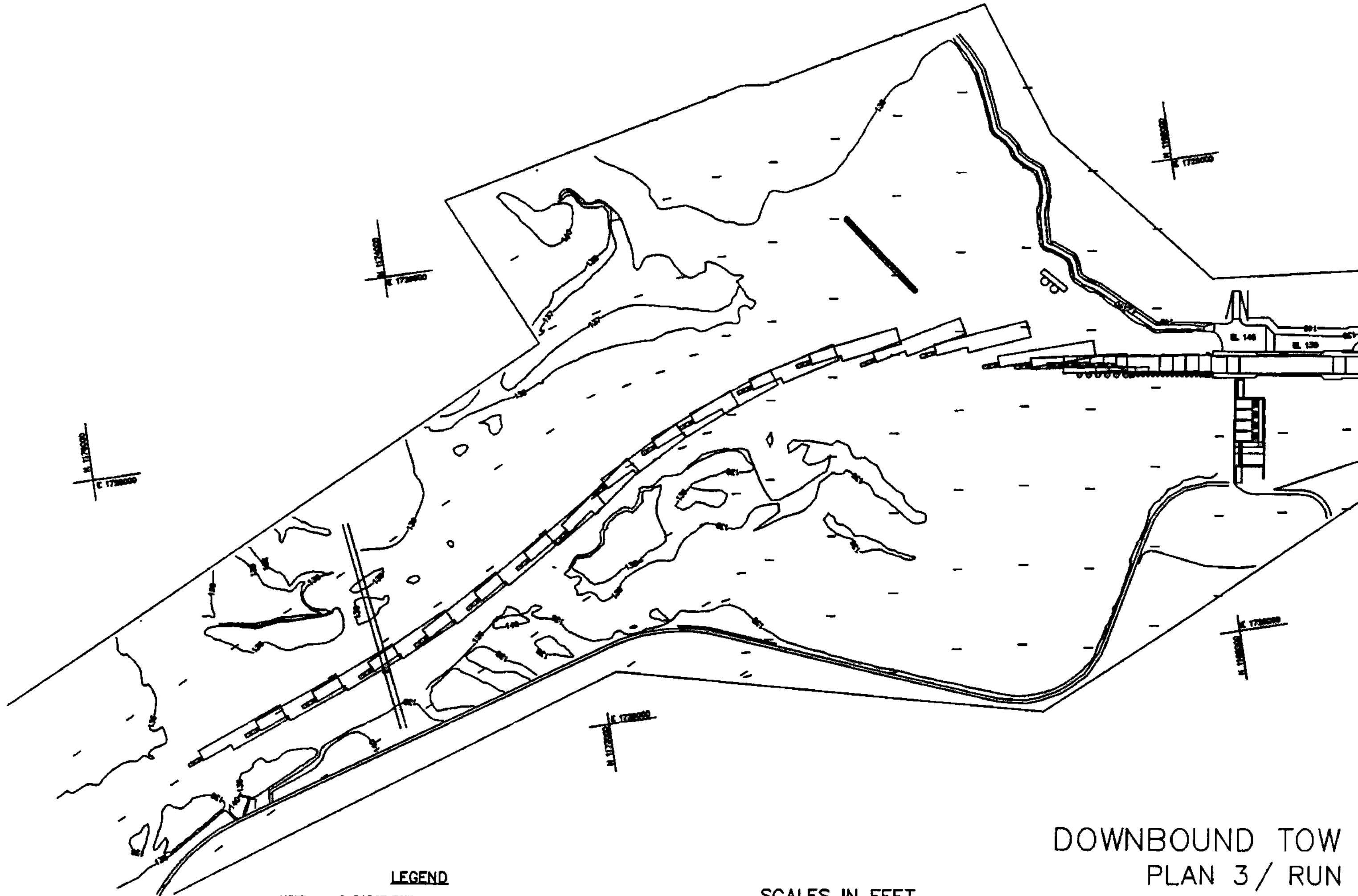
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
PLAN 3 / RUN 1
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



LEGEND

NOTE : 8–BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE
IN FEET REFERRED TO OHIO RIVER DATUM

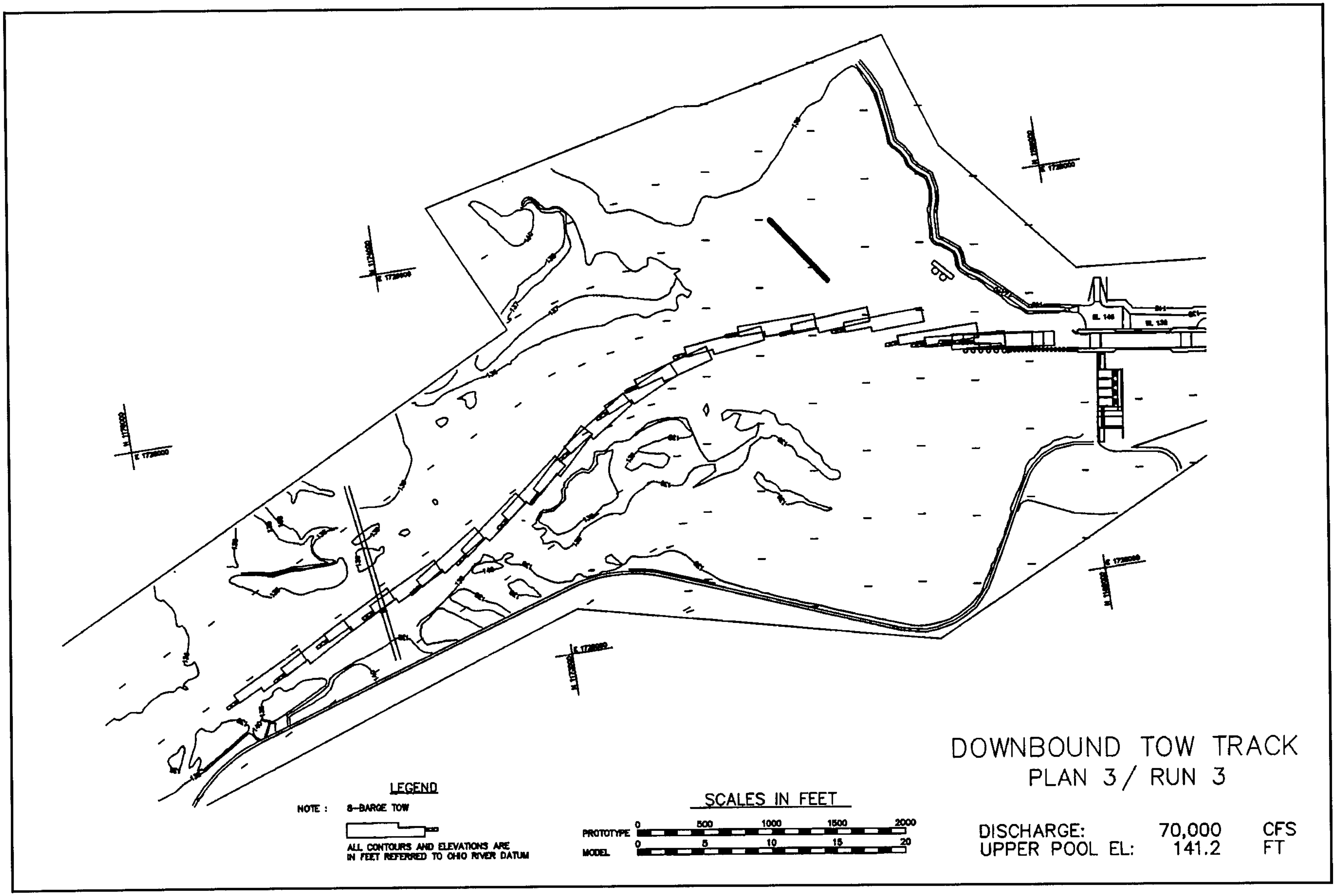
SCALES IN FEET

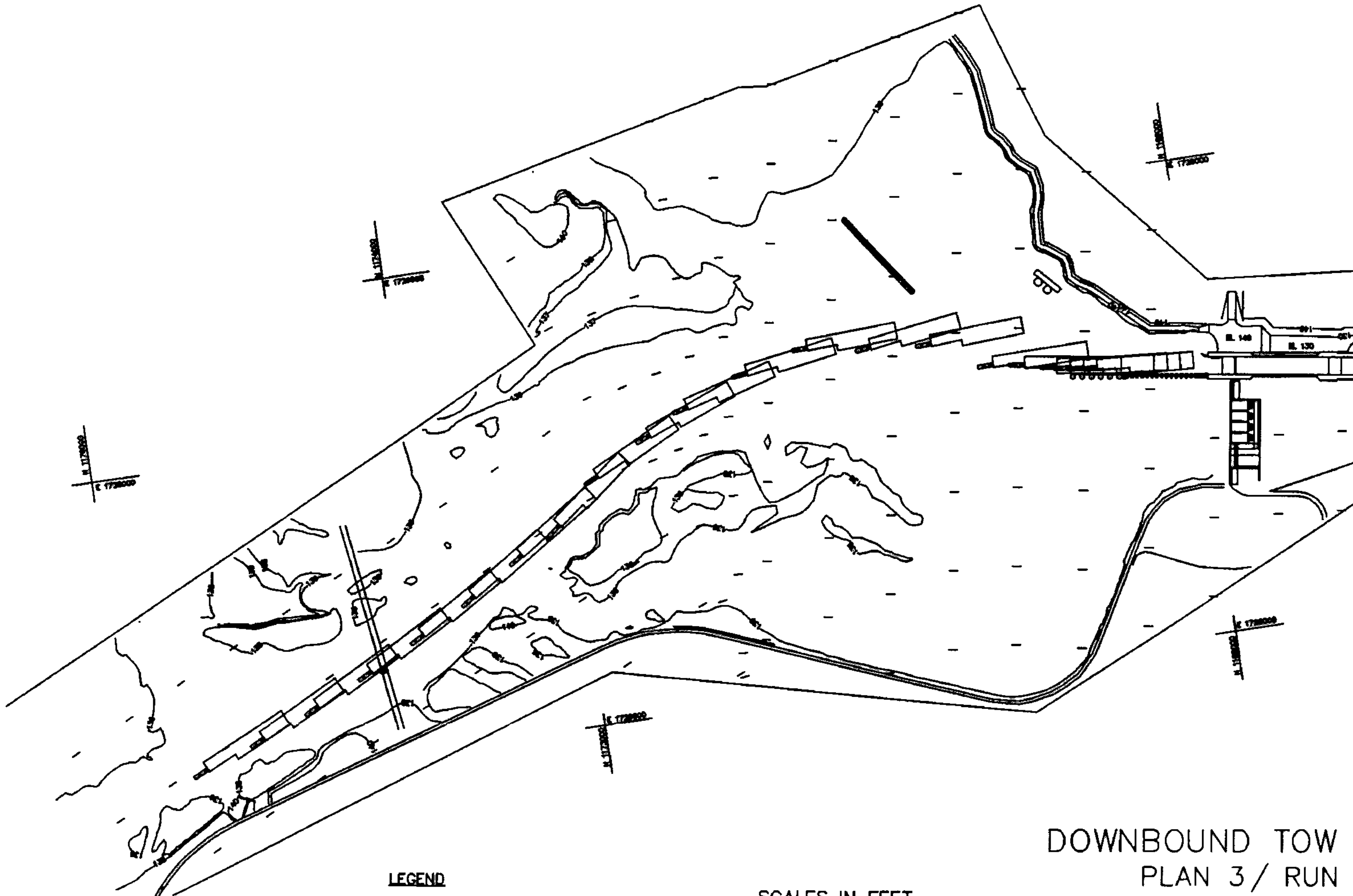
PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DOWNBOUND TOW TRACK
PLAN 3 / RUN 2

DISCHARGE:	70,000	CFS
UPPER POOL EL:	141.2	FT


DOWNBOUND TOW TRACK
PLAN 3 / RUN 3
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



DOWNBOUND TOW TRACK
PLAN 3 / RUN 4

LEGEND

NOTE : 8-BARGE TOW

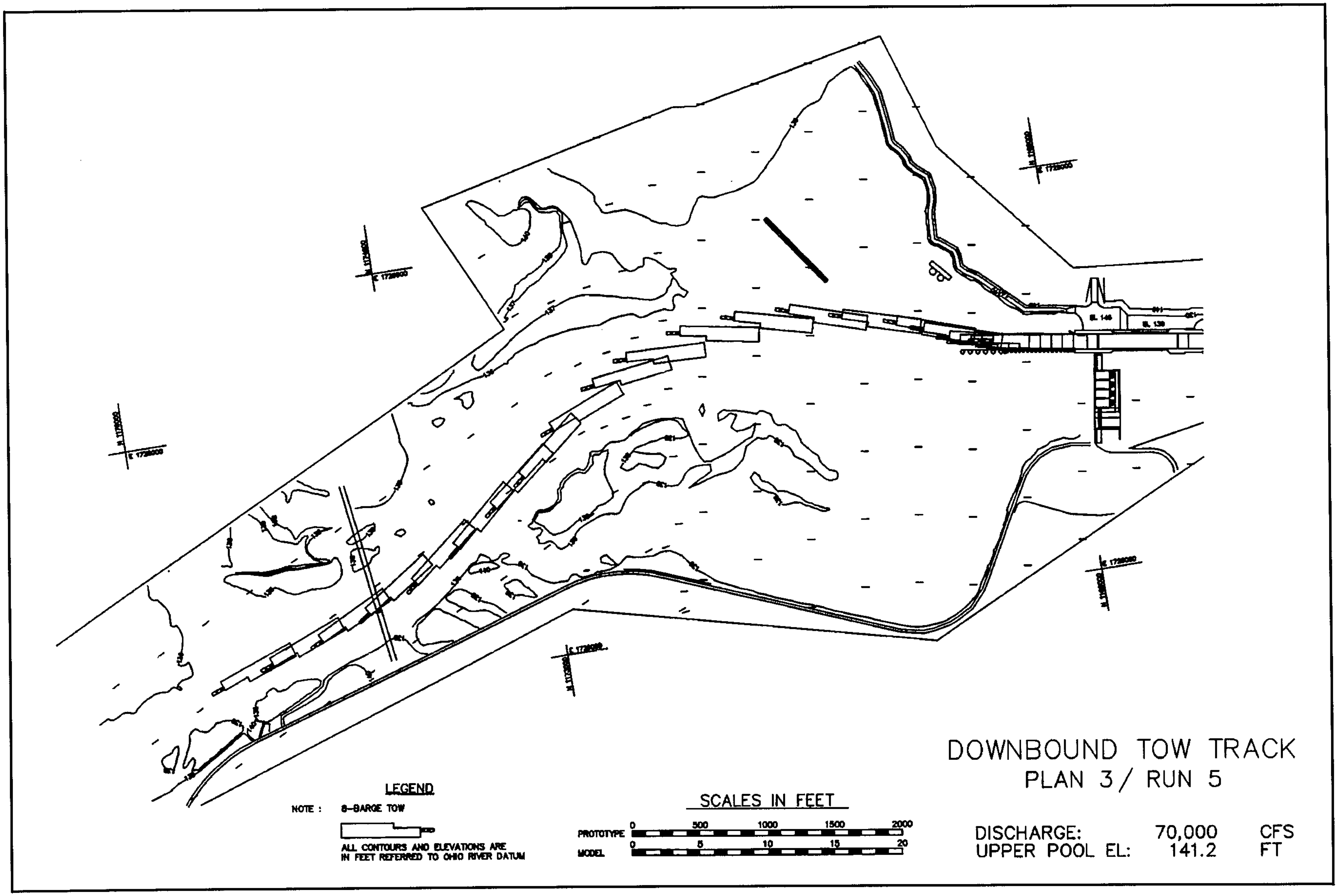
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

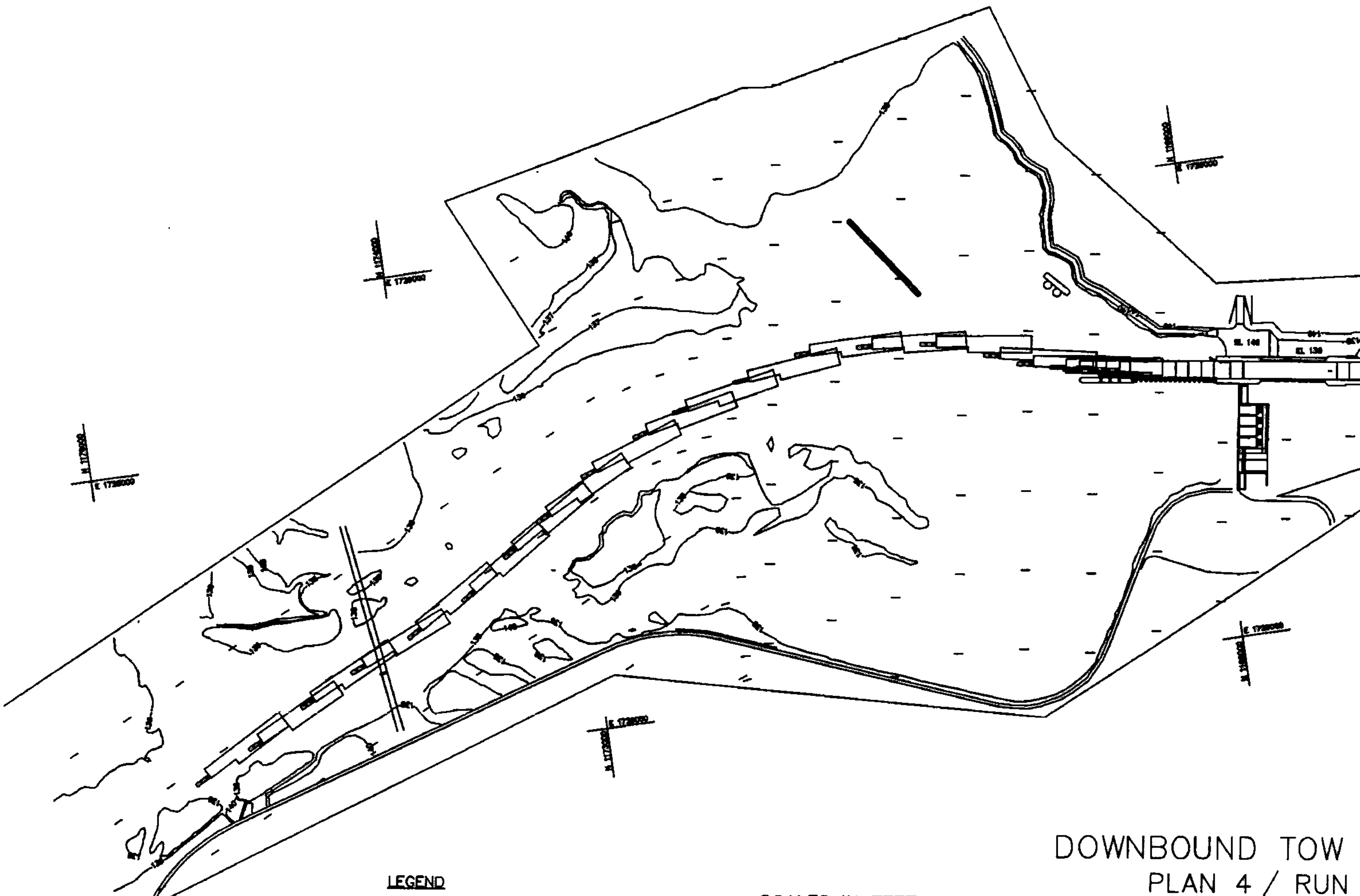
SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DISCHARGE:	70,000	CFS
UPPER POOL EL:	141.2	FT


DOWNBOUND TOW TRACK
PLAN 3 / RUN 5
DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



DOWNBOUND TOW TRACK

PLAN 4 / RUN 1

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT

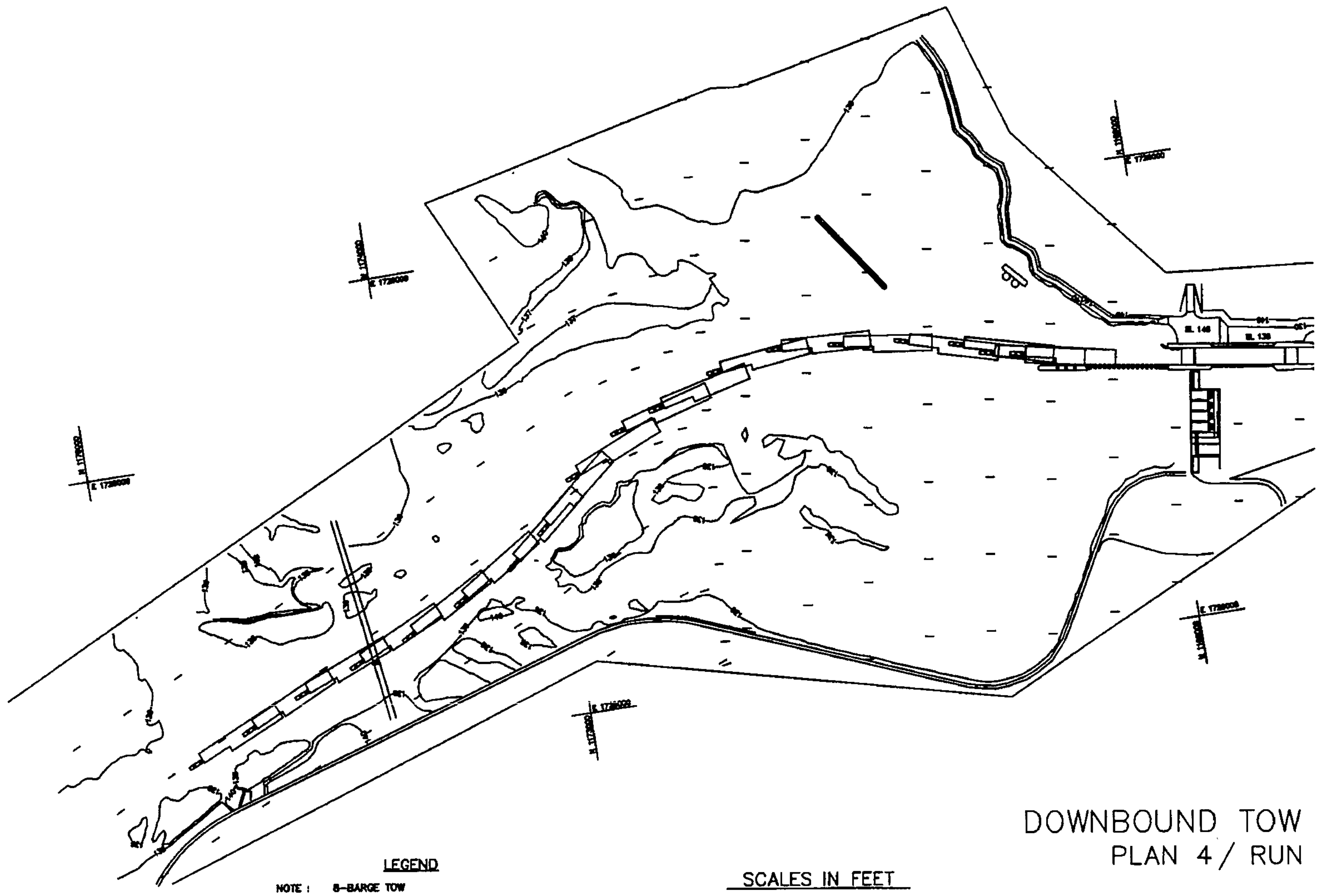
LEGEND

NOTE : 8–BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20



DOWNBOUND TOW TRACK
PLAN 4 / RUN 2

DISCHARGE: 20,000 CFS
UPPER POOL EL: 136.0 FT

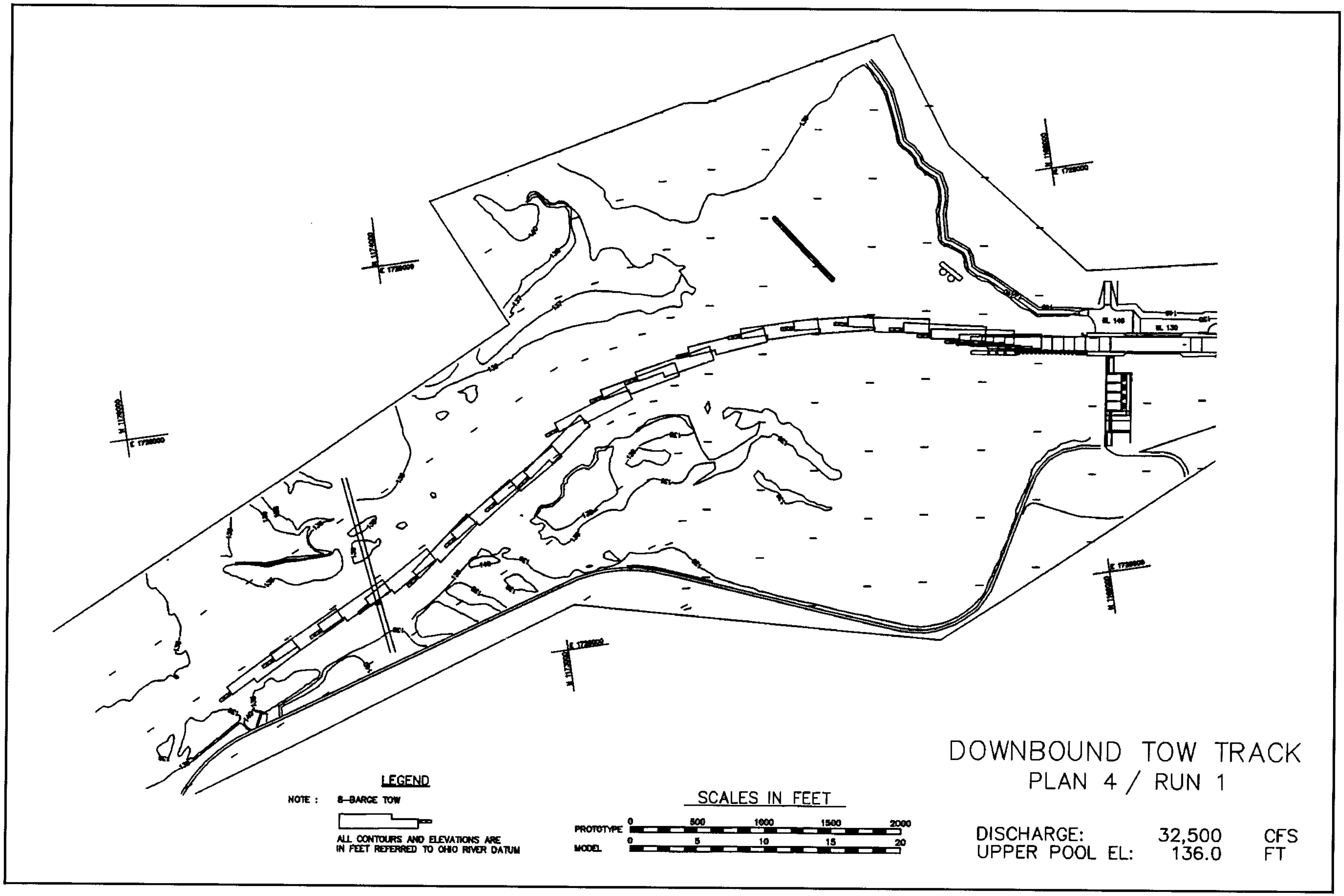
SCALES IN FEET

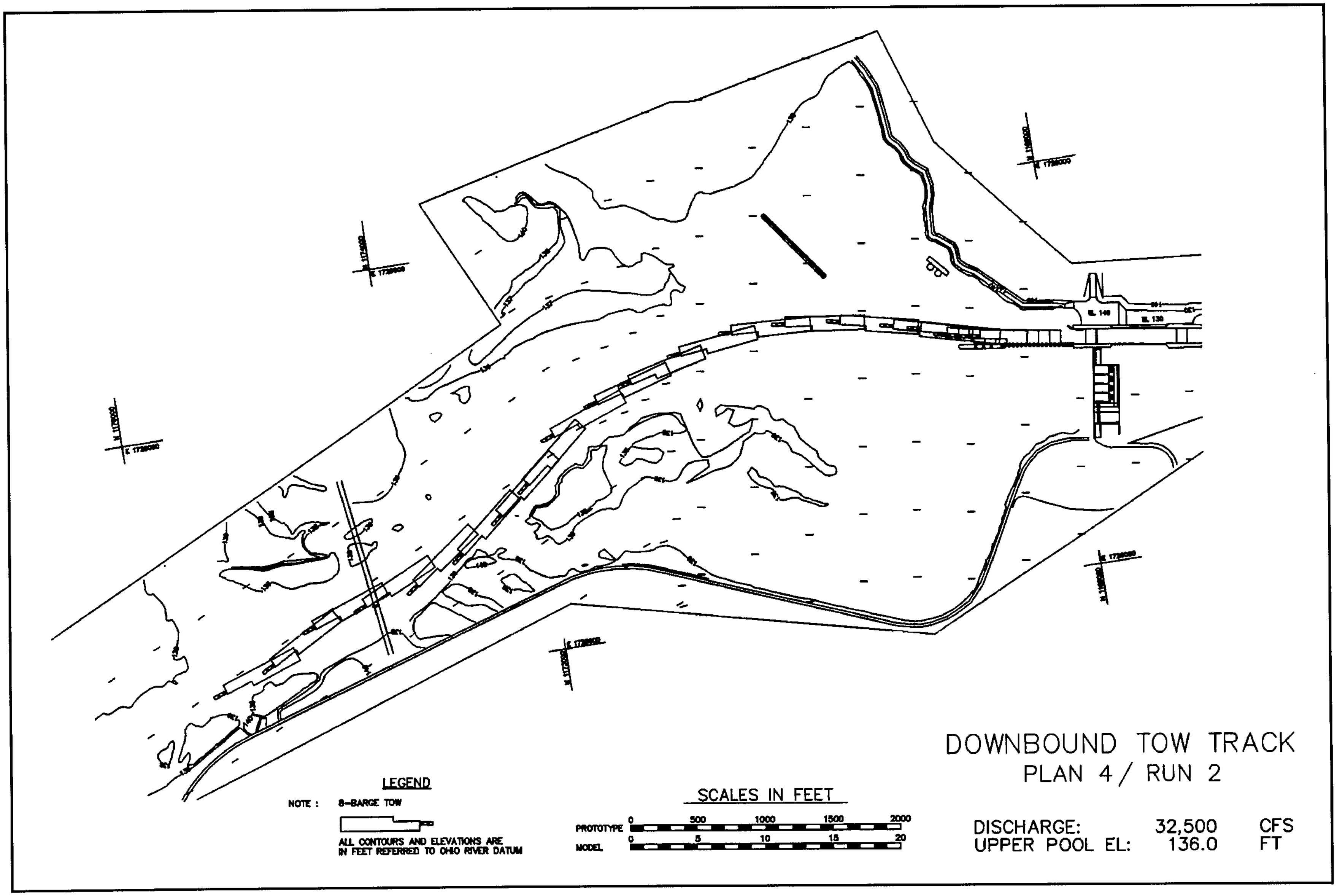
PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20

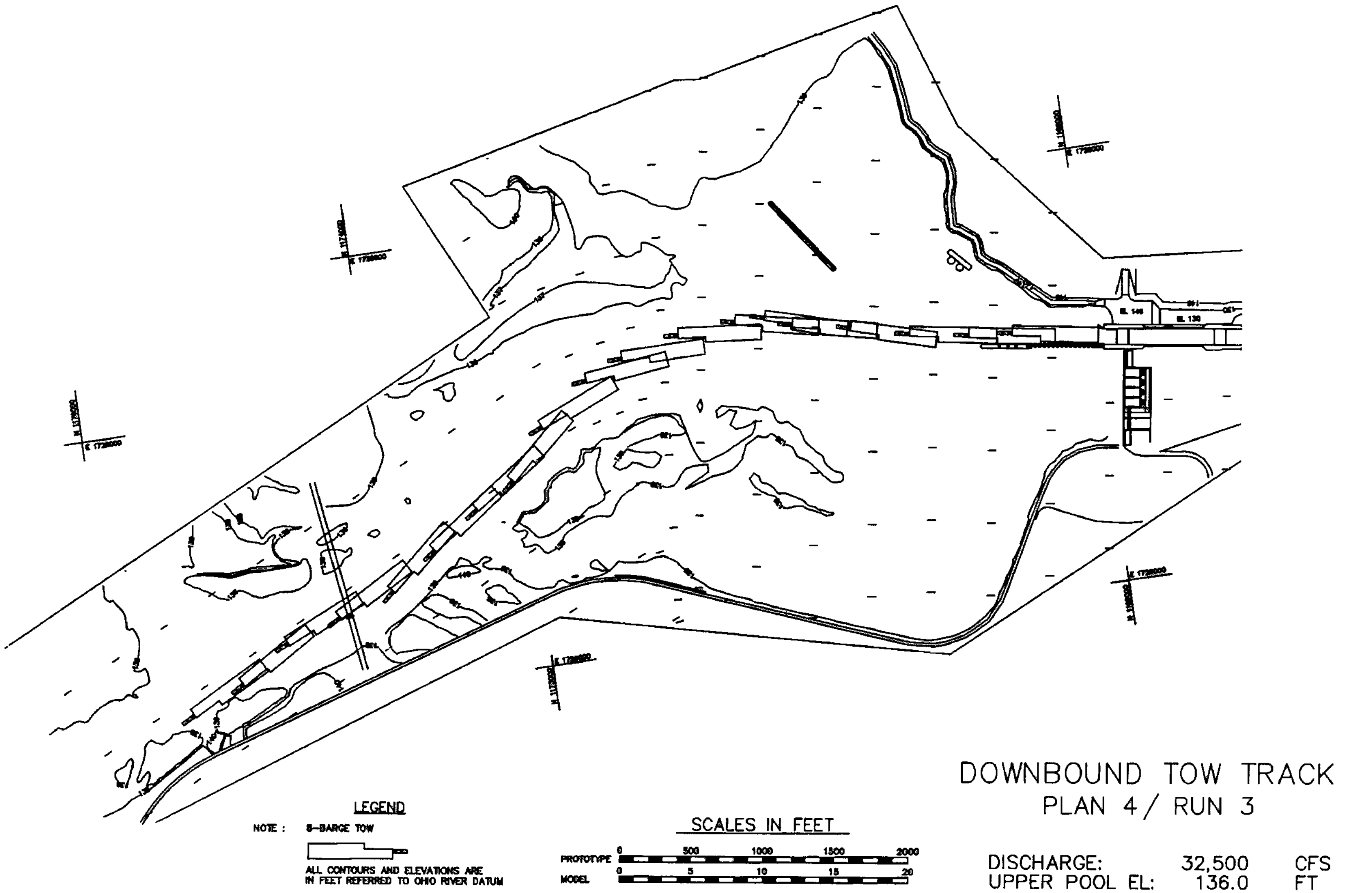
LEGEND

NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

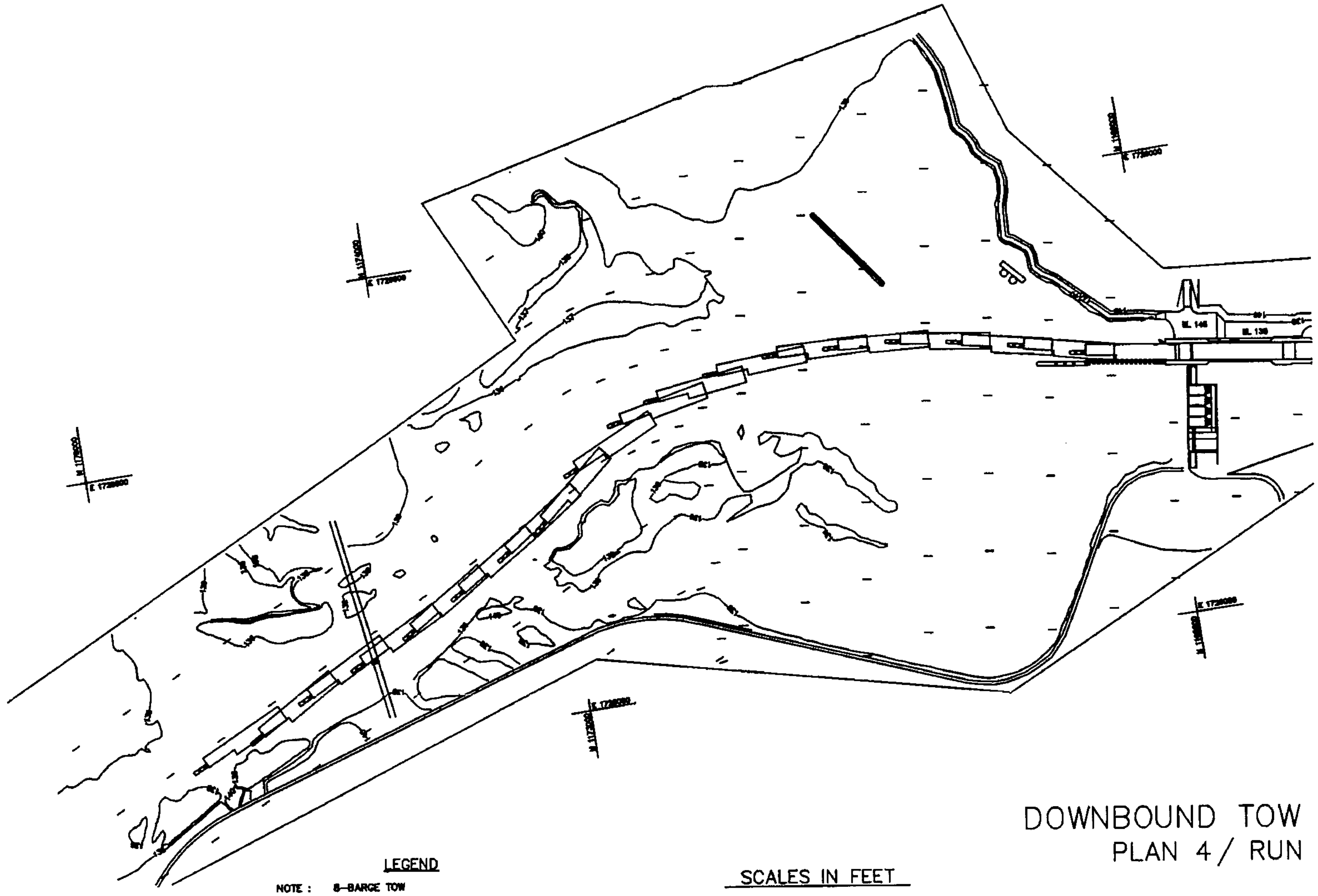

LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
DOWNBOUND TOW TRACK
PLAN 4 / RUN 1
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT


DOWNBOUND TOW TRACK
PLAN 4 / RUN 2
DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
EL 140
EL 130



DOWNBOUND TOW TRACK
PLAN 4 / RUN 3

DISCHARGE: 32,500 CFS
UPPER POOL EL: 136.0 FT



DOWNBOUND TOW TRACK
PLAN 4 / RUN 4

LEGEND

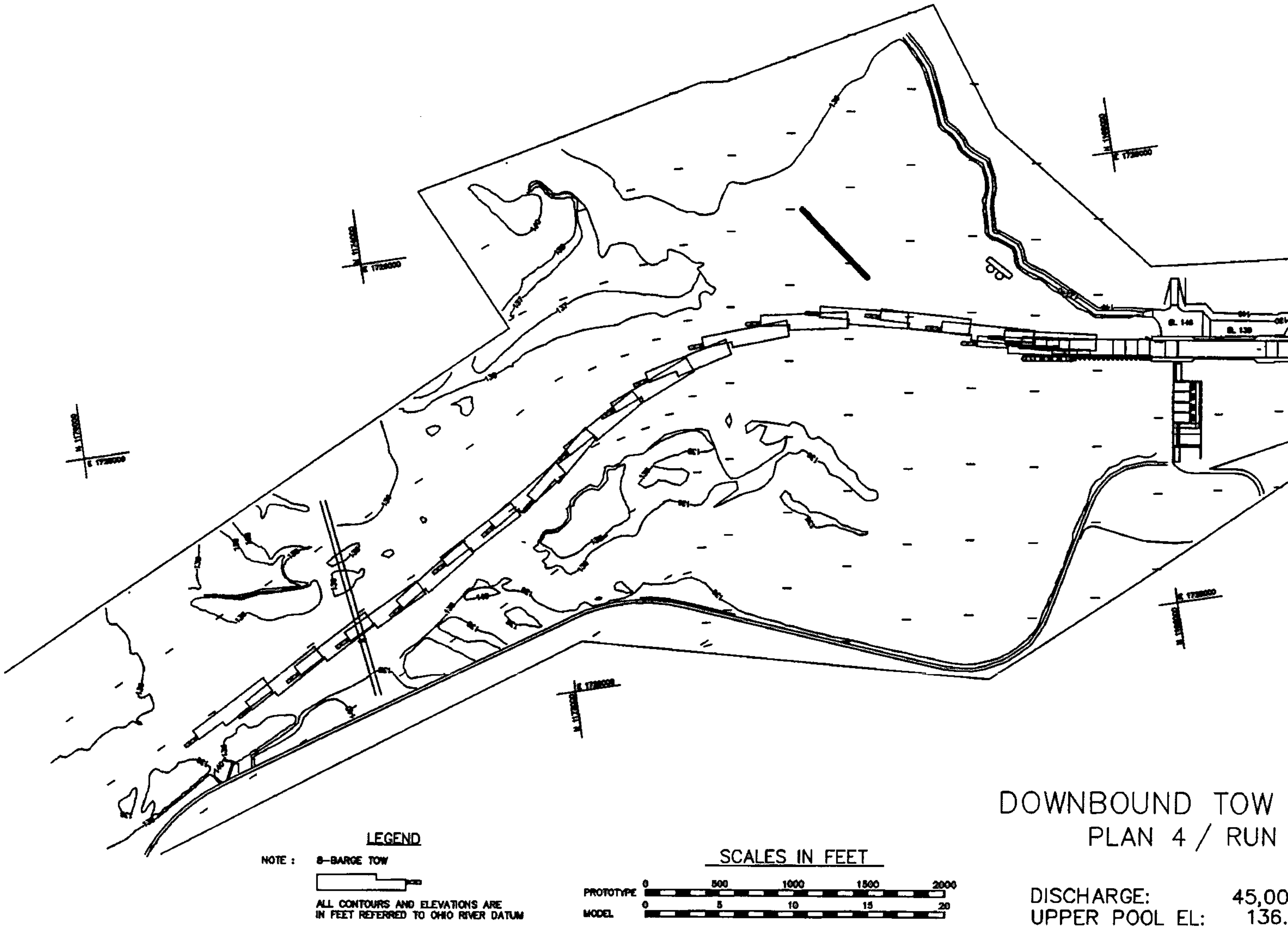
NOTE : 8-BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

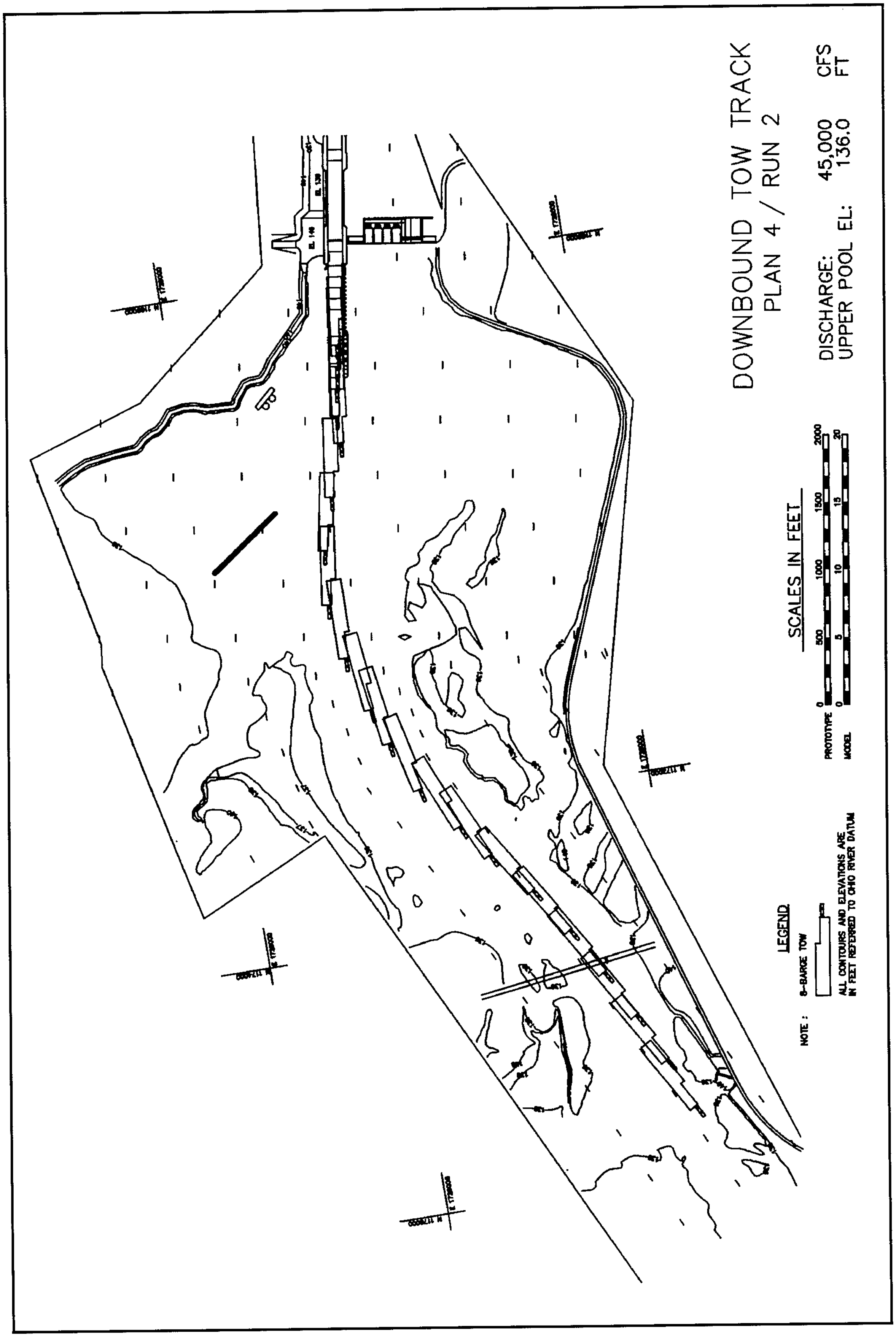
PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20

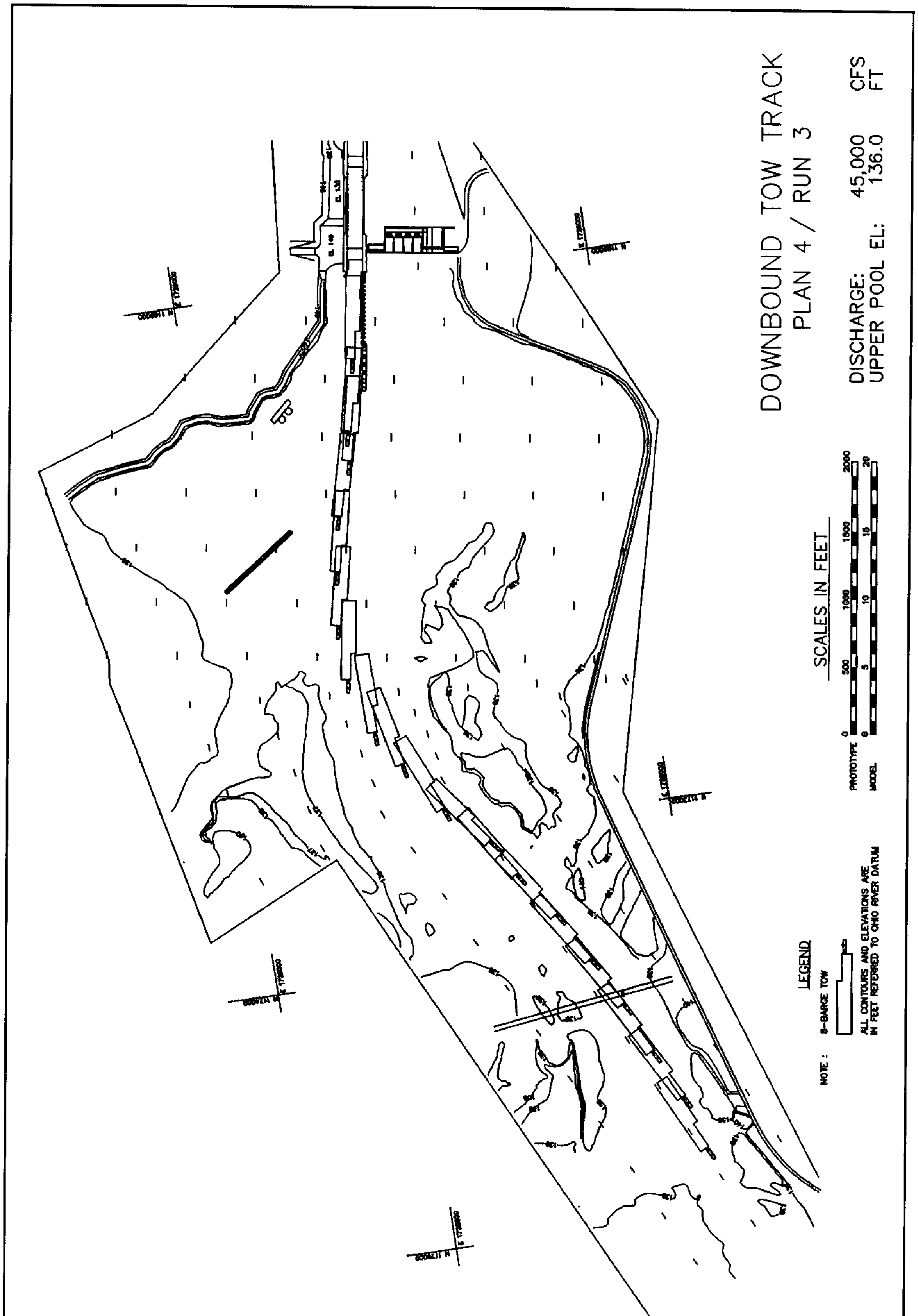
DISCHARGE:	32,500	CFS
UPPER POOL EL:	136.0	FT



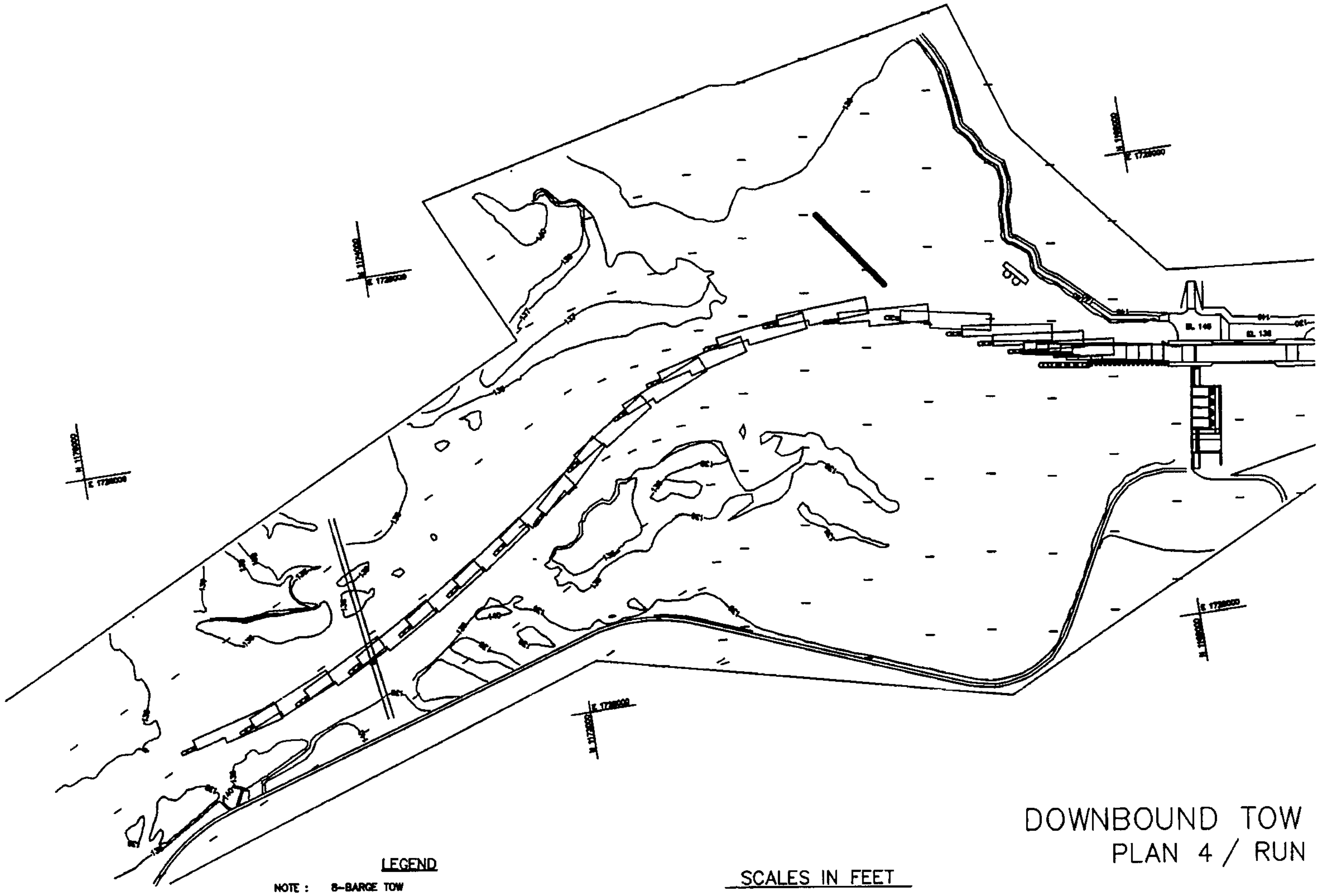
DOWNBOUND TOW TRACK
PLAN 4 / RUN 1

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT


DOWNBOUND TOW TRACK
PLAN 4 / RUN 2
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE : ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 4 / RUN 3
DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 4 / RUN 4

DISCHARGE: 45,000 CFS
UPPER POOL EL: 136.0 FT

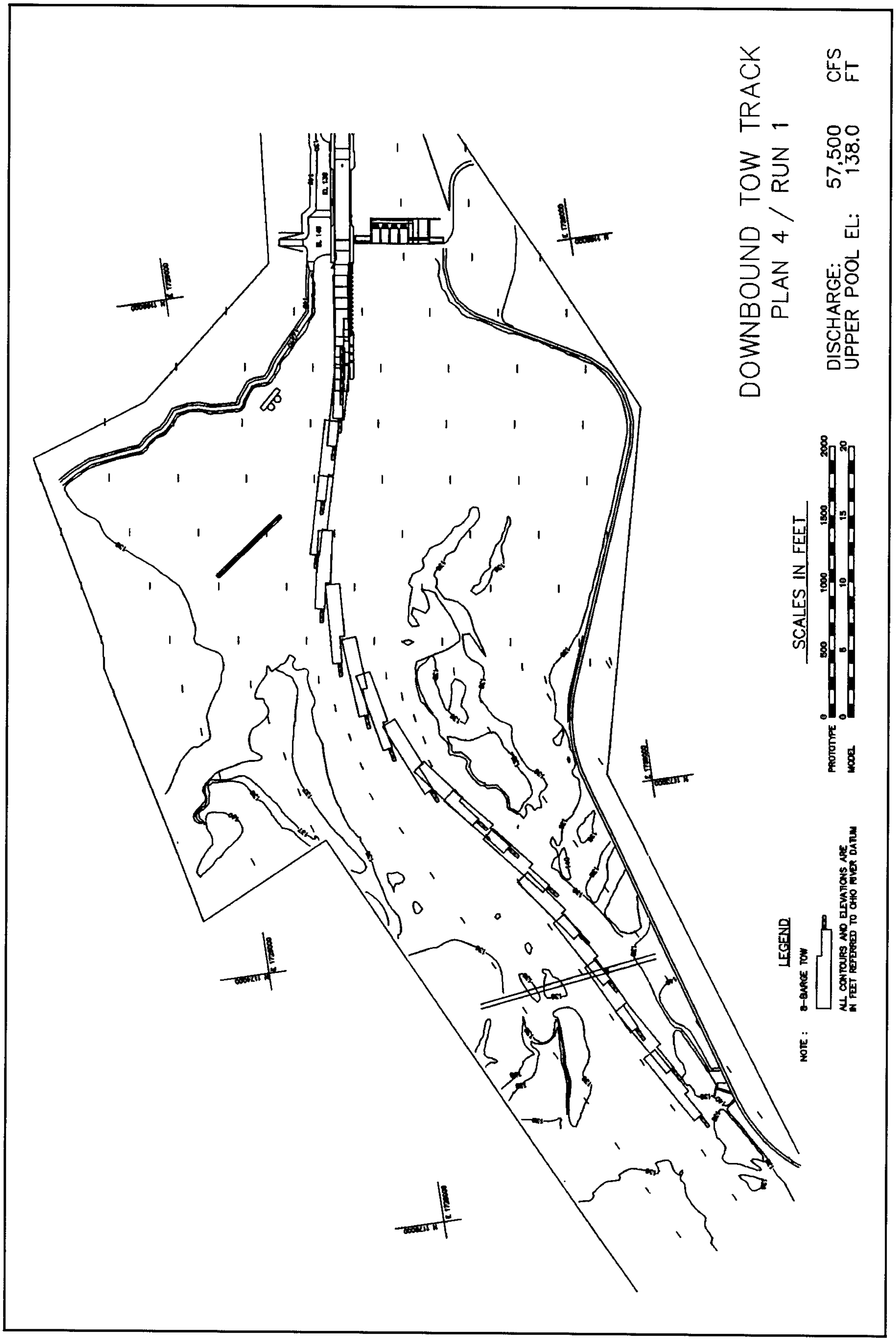
LEGEND

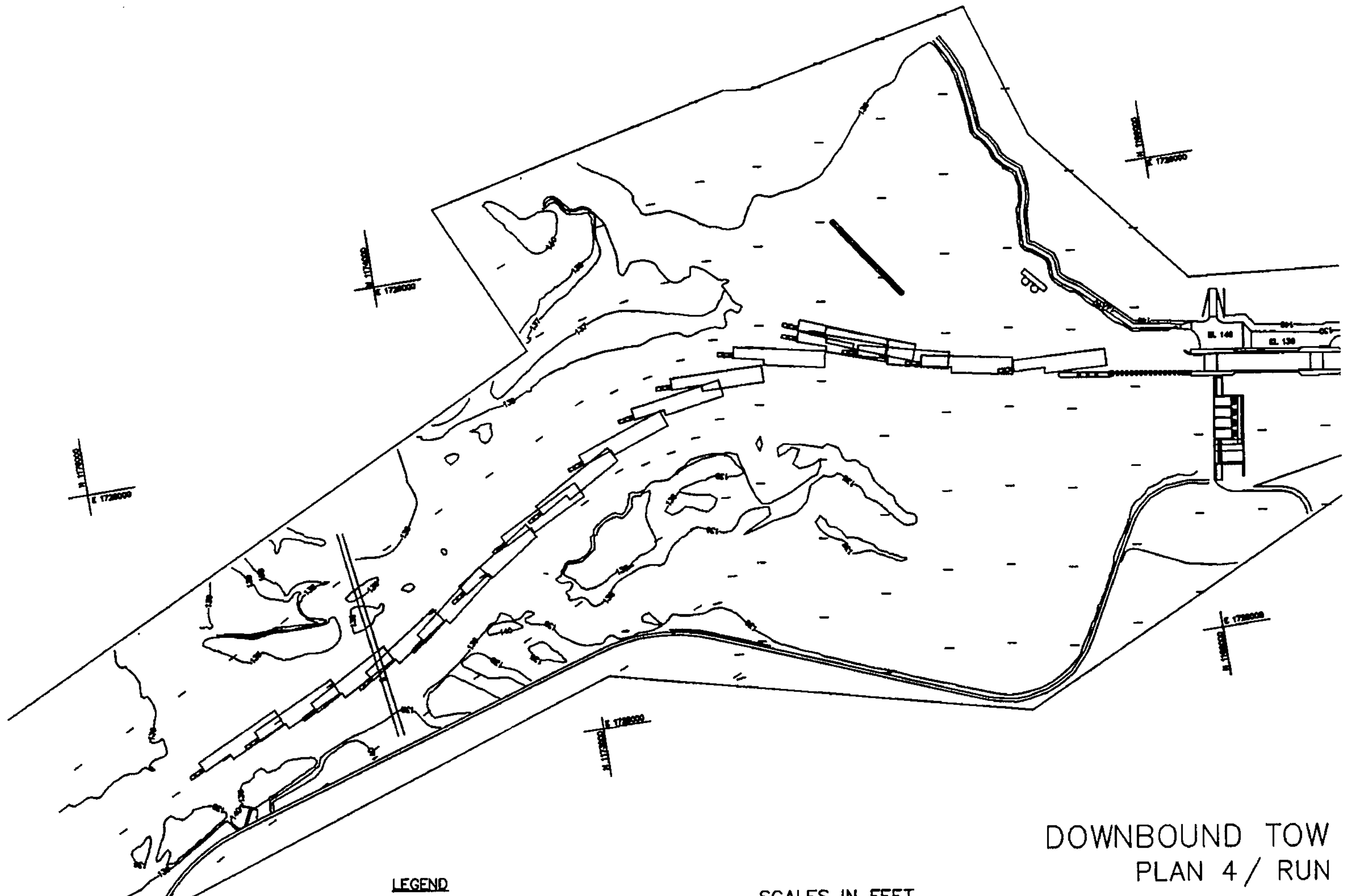
NOTE : 8–BARGE TOW

ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20


DOWNBOUND TOW TRACK
PLAN 4 / RUN 1
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
8-BARGE TOW
NOTE: ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM



DOWNBOUND TOW TRACK
PLAN 4 / RUN 2

LEGEND

NOTE : 8-BARGE TOW

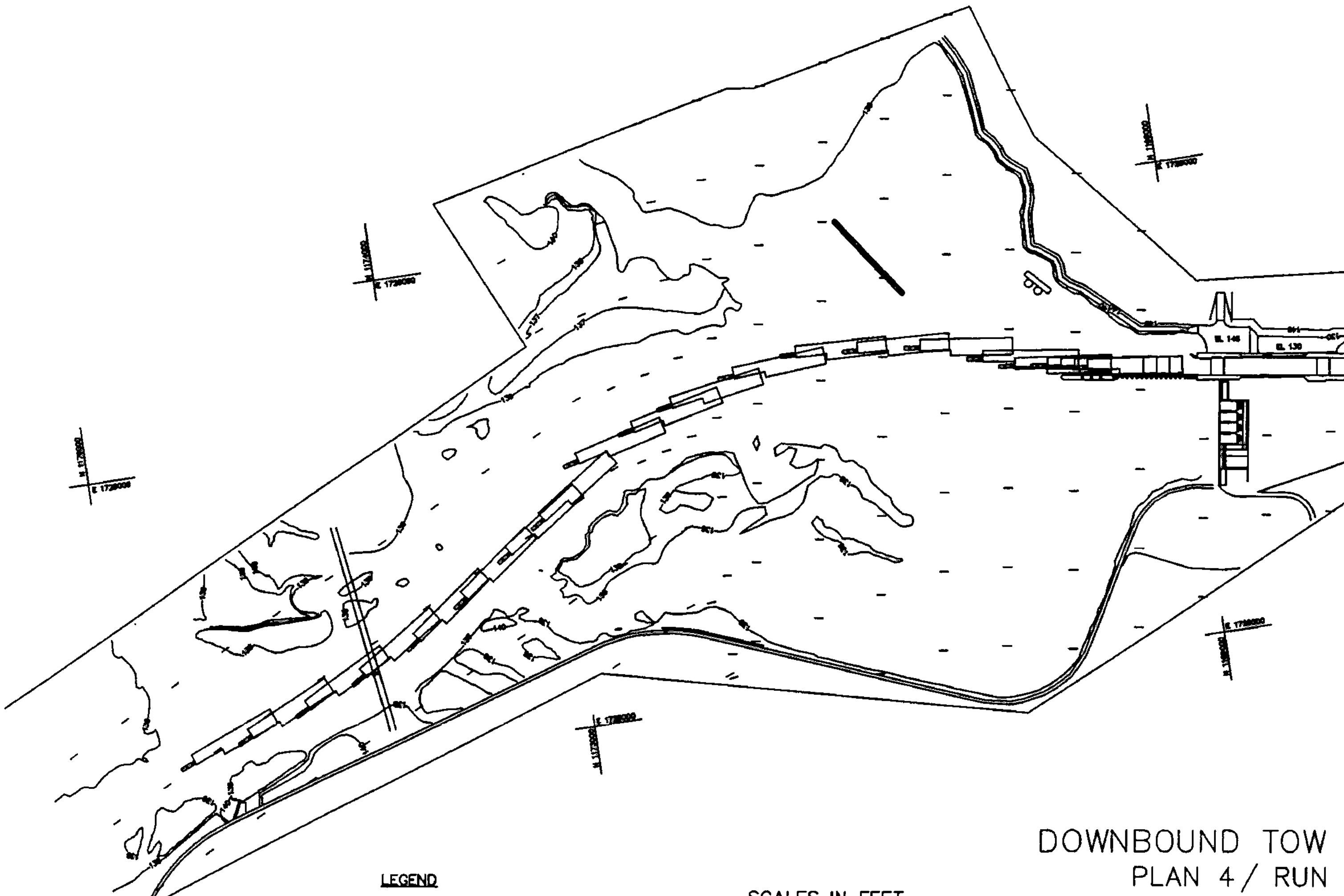
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

SCALES IN FEET

PROTOTYPE 0 500 1000 1500 2000

MODEL 0 5 10 15 20

DISCHARGE:	57,500	CFS
UPPER POOL EL:	138.0	FT



LEGEND

NOTE : 8–BARGE TOW

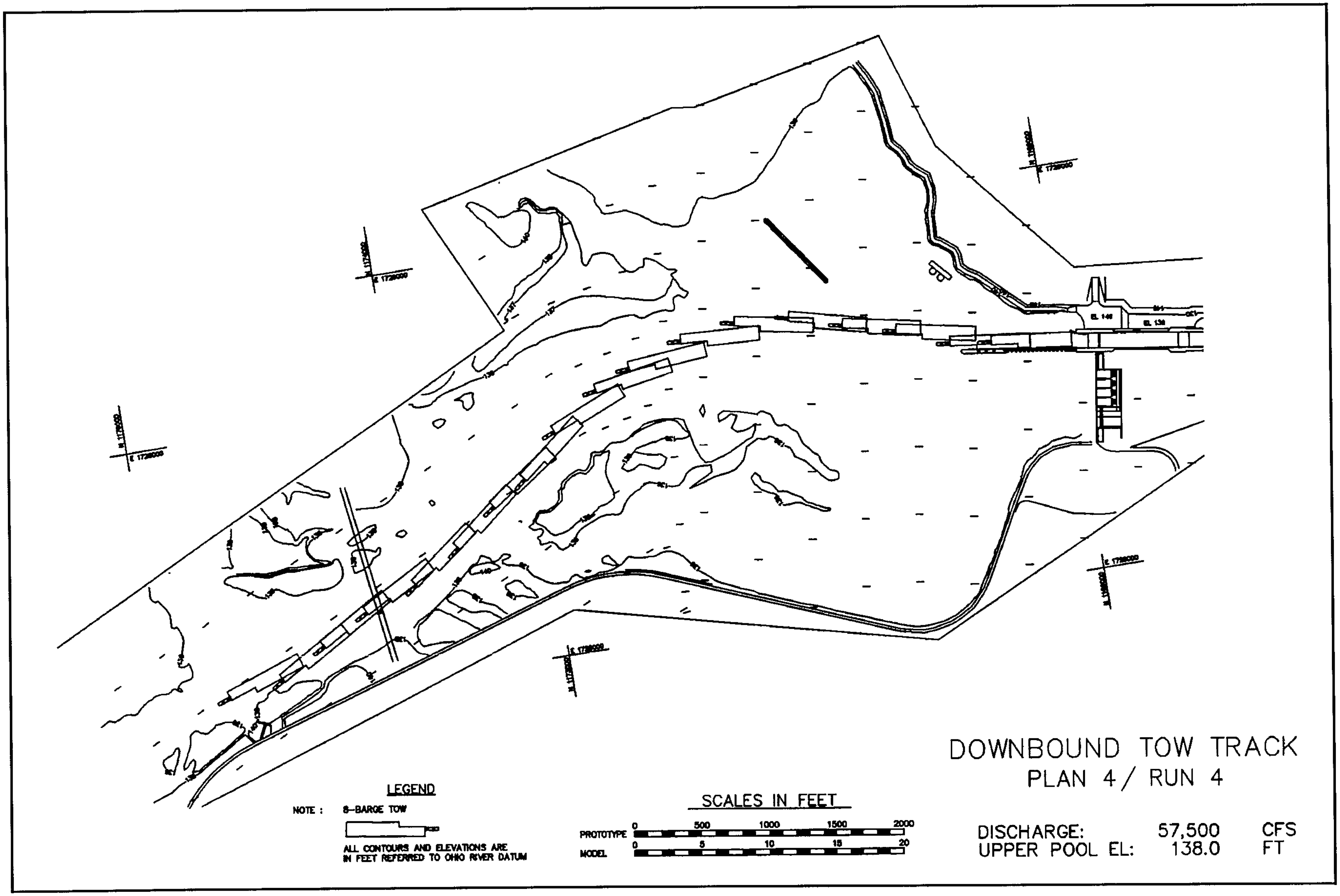
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM

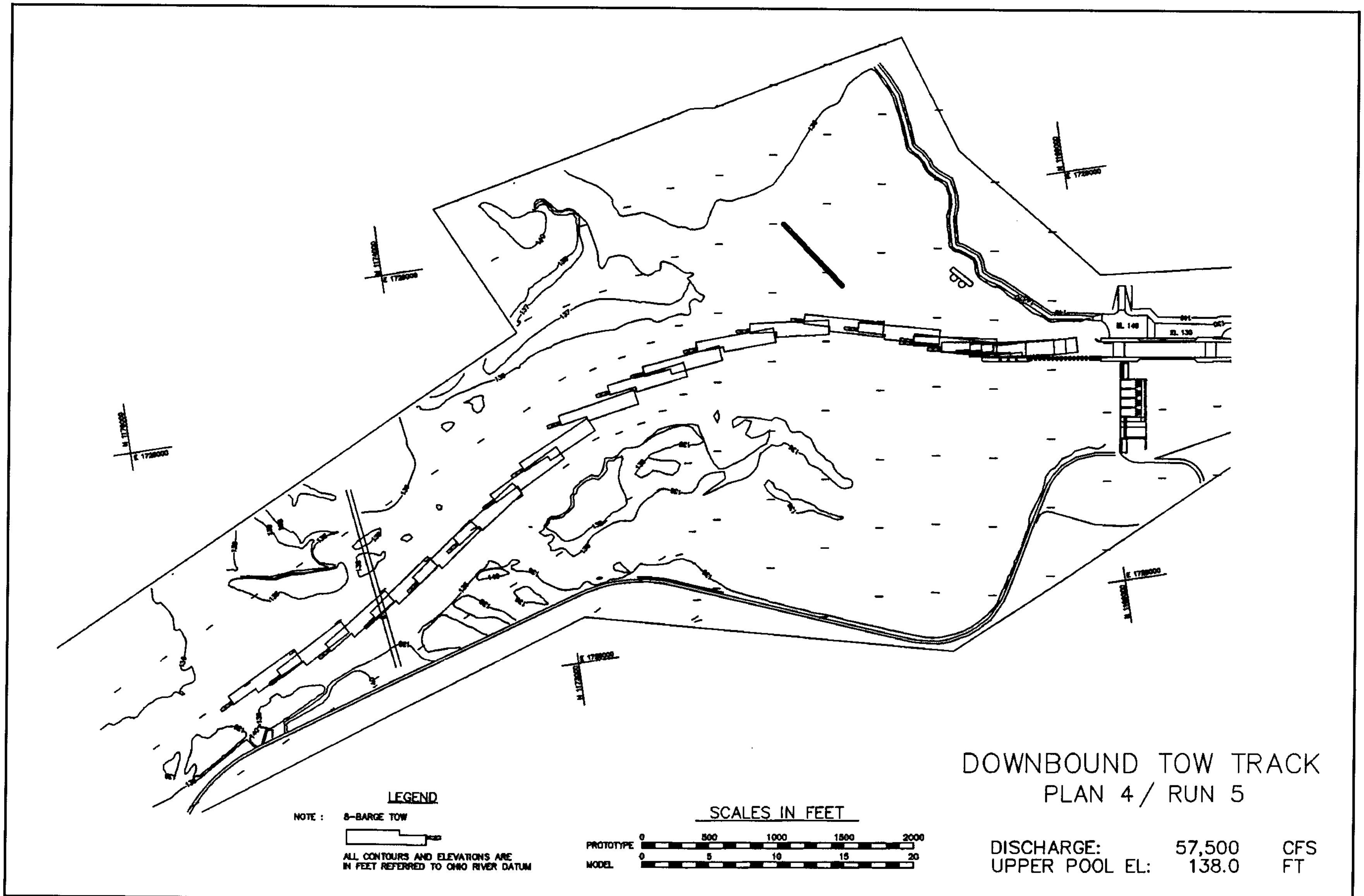
SCALES IN FEET

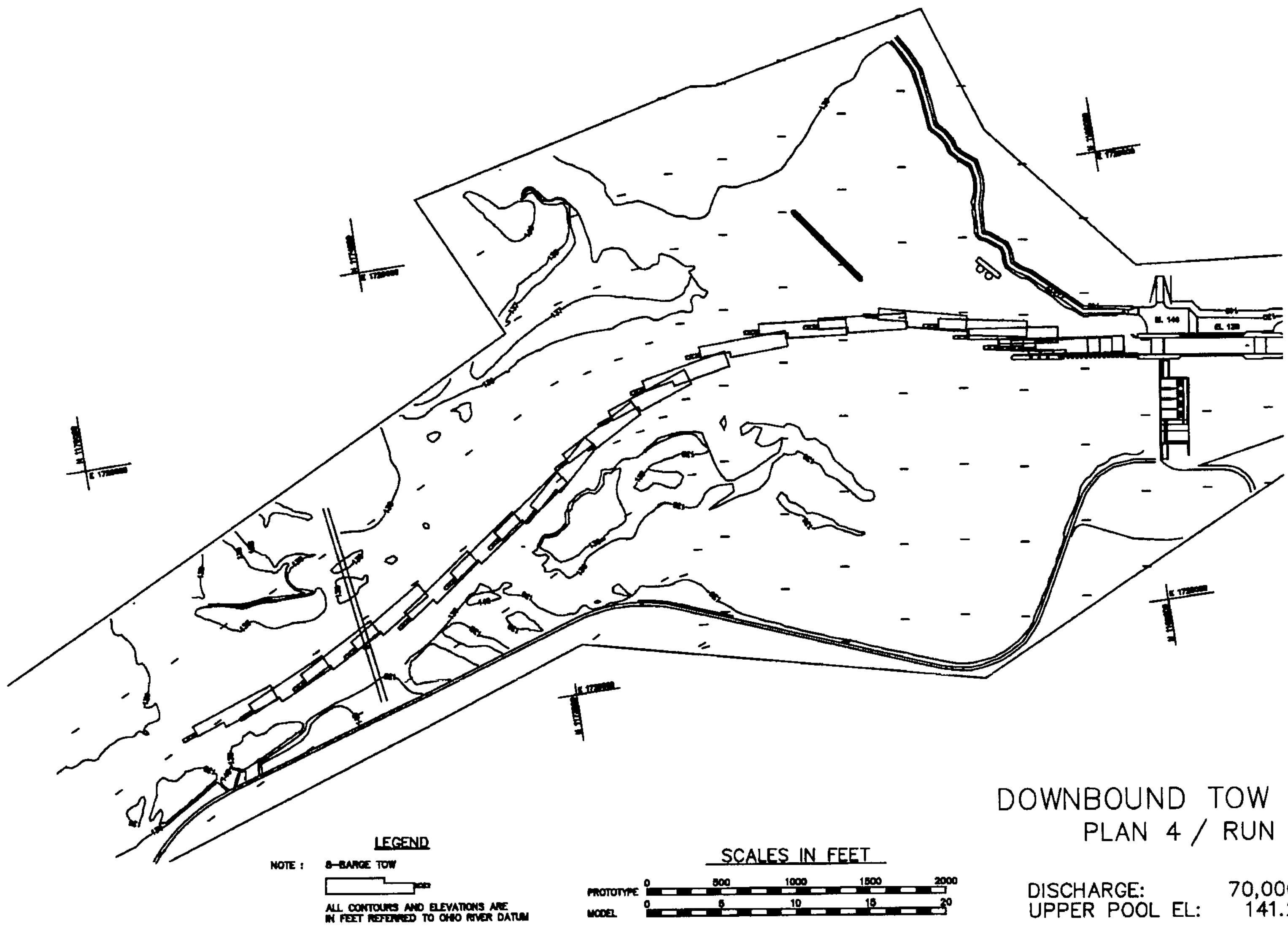
PROTOTYPE	0	500	1000	1500	2000
MODEL	0	5	10	15	20

DOWNBOUND TOW TRACK
PLAN 4 / RUN 3

DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT

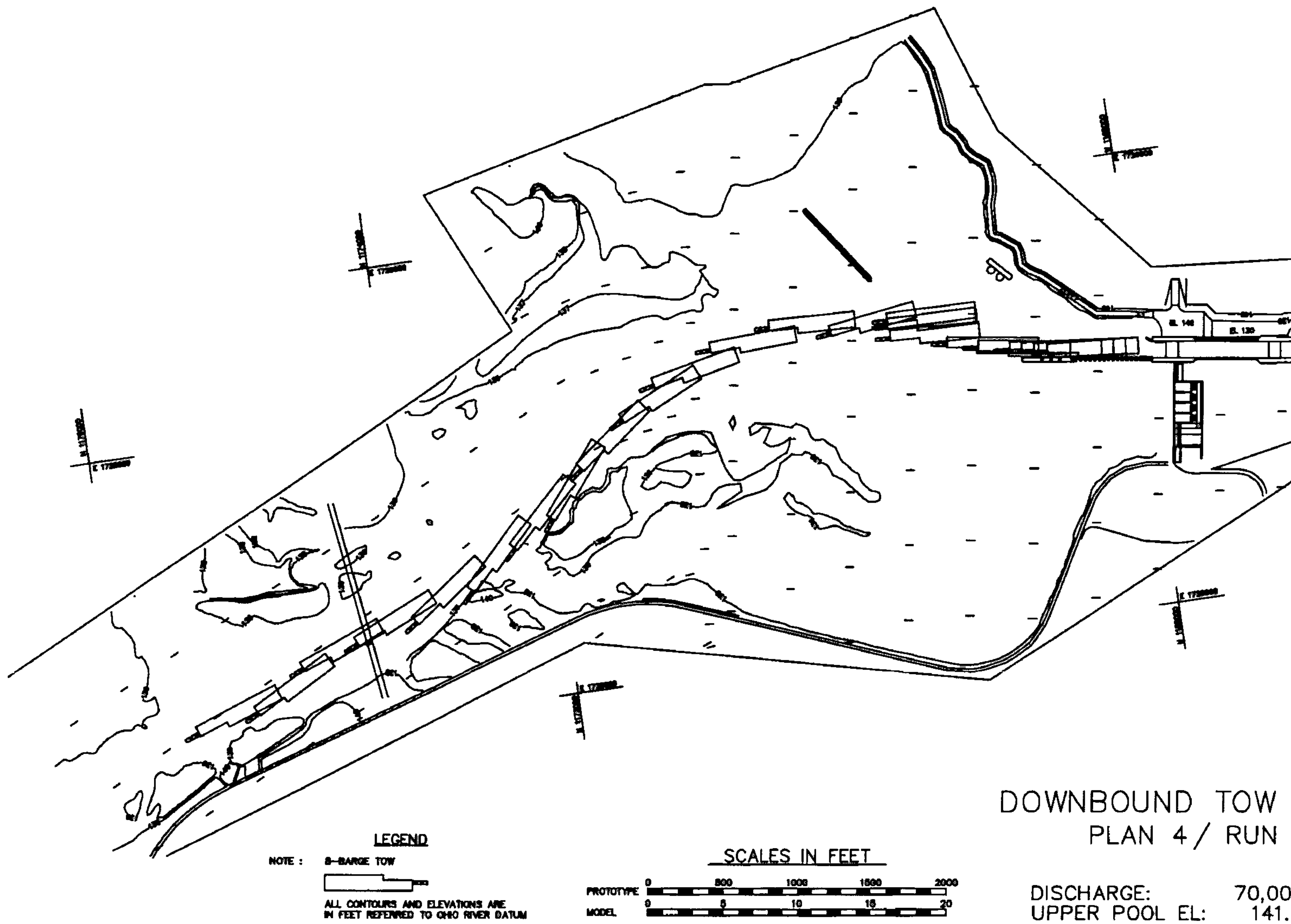

DOWNBOUND TOW TRACK
PLAN 4 / RUN 4
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
LEGEND
NOTE : 8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
EL 140
EL 138


DOWNBOUND TOW TRACK
PLAN 4 / RUN 5
DISCHARGE: 57,500 CFS
UPPER POOL EL: 138.0 FT
SCALES IN FEET
PROTOTYPE 0 500 1000 1500 2000
MODEL 0 5 10 15 20
LEGEND
NOTE :
8-BARGE TOW
ALL CONTOURS AND ELEVATIONS ARE IN FEET REFERRED TO OHIO RIVER DATUM
EL 140
EL 130



DOWNBOUND TOW TRACK
PLAN 4 / RUN 1

DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT



DOWNBOUND TOW TRACK
PLAN 4 / RUN 2

DISCHARGE: 70,000 CFS
UPPER POOL EL: 141.2 FT

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*

2. REPORT DATE
March 2001

3. REPORT TYPE AND DATES COVERED
Final report

4. TITLE AND SUBTITLE
Outdraft at Lock Approach, Tom Bevill Lock and Dam, Alabama; Hydraulic Model Investigation

5. FUNDING NUMBERS

6. AUTHOR(S)
Gary C. Lynch

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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Coastal and Hydraulics Laboratory
3909 Halls Ferry Road, Vicksburg, MS 39180-6199

8. PERFORMING ORGANIZATION REPORT NUMBER
ERDC/CHL TR-01-4

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Engineer District, Mobile
P.O. Box 2288
Mobile, AL 36628-0001

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The Tom Bevill Lock and Dam is approximately 1 mile southwest of Pickensville in Pickens County, AL. The lock is located on the left overbank about 332.7 river miles above the mouth of the Mobile River and is designed to maintain a minimum upper pool extending upstream to river mile 342.2 during low flows. The lock is 110 ft by 600 ft clear chamber dimensions. The dam consists of a gated spillway in the river channel and an adjacent 150-ft overflow weir on the right overbank. The lock is connected to the dam with a 150-ft abutment wall. A strong crosscurrent or outdraft existing in and around the upstream lock entrance causes difficulty for tow traffic navigating the lock. The purpose of the model study is to suggest possible solutions to improve and/or correct the outdraft for the approach of tows.

14. SUBJECT TERMS

Bendway weirs	Lock	Tom Bevill
Dam	Navigation study	Vane dike
Dike	Outdraft	

15. NUMBER OF PAGES
230

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT
UNCLASSIFIED

18. SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

19. SECURITY CLASSIFICATION OF ABSTRACT

20. LIMITATION OF ABSTRACT